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DIESEL RAILWAY TRACTION SUPPLEMENT

The May issue of THE RAILWAY GAZETTE *Supplement, illustrating and describing developments in Diesel Railway Traction, will be ready on May* 1, *price* 1*s.*

TO CALLERS AND TELEPHONERS

Until further notice our office hours are: Mondays to Fridays, 9.30 *a.m. till* 5.30 *p.m.*
The office is closed on Saturdays

ANSWERS TO ENQUIRIES

By reason of staff shortage due to enlistment, we regret that it is no longer possible for us to answer enquiries involving research, or to supply dates when articles appeared in back numbers, either by telephone or by letter

ERRORS, PAPER, AND PRINTING

Owing to shortage of staff and altered printing arrangements due to the war, and less time available for proof reading, we ask our readers' indulgence for typographical and other errors they may observe from time to time, also for poorer paper and printing compared with pre-war standards

Nationalisation of Iron and Steel

IN the House of Commons on April 17 the Minister of Supply announced that the Government had reached the conclusion that the position of the iron and steel industry and its importance in the national economy, necessitated "a large measure of public ownership" and that legislation for this purpose should be prepared. The report which the Coalition Government had invited the iron and steel industry to submit, had been received and considered. This report set out plans for the development and modernisation of the industry over the next five to seven years, at an estimated cost of £168,000,000, and reports also had been received from the Joint Iron Council dealing with the foundry iron and iron foundry sides of the industry. Immediate discussion would take place to see that urgent modernisation and development schemes were carried through without delay. It was proposed to establish a Control Board which would replace the existing Iron & Steel Control and would be responsible to the Minister for the general control and supervision of the industry. The Board would advise the Minister on questions arising in the preparation of the scheme of nationalisation, including the definition of the sections of the industry to be taken into public ownership.

* * * *

A Decision of Political Expediency

A decision more grounded in political expediency and less in accord with the realities of industrial necessity is difficult to imagine. It is painfully clear that the Government has no idea of what its plans should be for the nationalisation of the iron and steel industry, what parts of that industry should be brought under public control, or what the effects of the measure, of which it has now given the broadest and vaguest outline, will be. What is clear is that it considers itself irrevocably tied to the party ideology of socialisation of basic industries, without thought or concern for the well-being of the industrial life of the nation. Its present action repudiates the declaration by Mr. Morrison that nationalisers should prove their case on the basis of public interest. The statement by the Minister of Supply does nothing to mitigate the uncertainties under which the industry is working. Until the boundaries within which nationalisation is to be effected have been laid down, there can be no assurance of continuity of policy within the industry, and the greatest obstacle to implementing plans of modernisation and development therefore remains. The ramifications of the British iron and steel industry are so great that its disturbance at this juncture must have effects which will reach far into the fabric of the national economy. The complexity of the task which faces the Control Board in defining the sections of the industry to be taken into public ownership must prolong the period of uncertainty for very many months.

* * * *

Mr. R. J. Armstrong

The retirement of Mr. R. J. Armstrong, Divisional Locomotive Superintendent, Worcester, G.W.R., after nearly fifty years' service, brings to an end a family connection with the railway which goes back to the early days of railways in this country. A portrait and some biographical details of Mr. Armstrong, who entered the service of the G.W.R. in June, 1896, are given in this issue. During the last century the Armstrong family has been closely associated with the design and performance of G.W.R. locomotives. The present Mr. Armstrong's grandfather, Mr. Joseph Armstrong, who came from the same village as George Stephenson and Timothy Hackworth, and was at school with Robert Stephenson, succeeded Sir Daniel Gooch as Locomotive Superintendent in 1864, and held the position till his death in 1877, when he was succeeded by another famous Locomotive Superintendent, William Dean. Joseph Armstrong was responsible for a number of locomotive designs, all of which were marked by extreme simplicity, and, although he made no bold departures from the orthodox practice of the period, in one respect he was ahead of most of his contemporaries in that his boilers were given a specially generous amount of heating surface. Mr. Armstrong's great-uncle, George Armstrong, at one time was Locomotive Superintendent of the Northern Division of the G.W.R., and Mr. Armstrong's father, John Armstrong, who also spent fifty years

with the company, was Divisional Locomotive Superintendent at Paddington. It was during Mr. Churchward's regime (1902-1921) that the title of Locomotive Superintendent was changed to that of Chief Mechanical Engineer.

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Overseas Railway Traffics

Although still showing deficits on the preceding year, Buenos Ayres & Pacific weekly traffics were only ps. 78,000 behind 1945 in the forty-first week, as compared with decreases of ps. 158,000 and ps. 128,000 in the thirty-ninth and fortieth weeks. The gains on the other three large companies were considerably less in the forty-first week than in the fortieth, when the increases were ps. 728,000 on the Buenos Ayres Great Southern, ps. 206,000 on the Buenos Ayres Western, and ps. 417,638 on the Central Argentine. A rainy period during the week was partly responsible for the smaller advances. Entre Rios receipts have declined by ps. 51,400 in the fortnight under review, but show an improvement on aggregate of ps. 1,164,300. Comparative figures are given in the following table:—

	No. of week	Weekly traffics	Inc. or dec.	Aggregate traffic	Inc. or dec.
Buenos Ayres & Pacific* ...	41	2,432	– 78	93,493	+ 3,989
Buenos Ayres Great Southern*	41	3,675	+ 190	146,707	+ 8,569
Buenos Ayres Western* ...	41	1,198	+ 32	49,281	+ 2,719
Central Argentine*	41	3,139	+ 230	129,559	+ 10,525
		£	£	£	£
Canadian Pacific	14	1,038,400	– 107,800	15,270,400	– 602,200

* Traffic returns in thousands of pesos

Canadian Pacific results to the end of March showed a decrease on aggregate of £494,400 compared with the first three months of 1945.

* * * *

War Effort of the Belgian Railways

At the moment of liberation, the Belgian National Railways system was devastated as a combined result of bombing and sabotage during the last months of occupation, and of destruction carried out by the Germans in their retreat. Prompt reinstatement of a transport service was essential, both to feed the population and to supply the advancing allied armies. The manner in which the staff of the railways tackled this immense problem during 1944 and 1945 is described in an illustrated booklet published by the Belgian National Railways Company,* in which the steady restoration of lines and the growth of traffic in the face of formidable obstacles are shown in a number of maps and diagrams. Many tributes to the efforts of the General Manager and staff received from allied commanding officers are reproduced. The flying bomb attacks and the German Ardennes offensive in the winter of 1944 were serious threats to the transport services, but called forth efforts and self-sacrifice on the part of the staff which will long be remembered.

* * * *

The Railway Labour Problem

The difficulties experienced by British railways in securing adequate labour, in post-war conditions, for maintaining and operating their systems are little more acute than those of lines in the United States. In an editorial our American contemporary *Railway Engineering & Maintenance* cites a recent case in which a railway in one of the eastern States endeavoured to recruit labour for permanent way work through an employment agency on one of its passenger stations. During a period allowed for applications, 36 men signed at the agency to be taken on. The office where the men were to be appointed to their duties was on the third floor of a building adjacent to the station, but only 24 of them put in an appearance there. By the time the new employees reached the track, four more of them had disappeared, and at the end of ten days sixteen more had found the work unpalatable and had gone. Finally, four only of the original 36 were left, and as in the meantime the railway had lost the services of eight other permanent way men employed in the same area, ultimately it was even worse off than when its advertisement was first put out. For the present, former war workers and demobilised servicemen are showing no disposition to go to work on the track, and little interest in bridge and building work. Conditions have been made worse by the United States Government having decreed the return to their own country not later than the end of February of all the Mexicans who have been doing good work on the U.S. railways during the war emergency period. The only solution of the problem now open to the railways appears to be to speed up the introduction of mechanised appliances for track maintenance.

* * * *

Southern Railway Summer Train Service

More than 200 additional trains will be run in the Southern Railway summer timetables which come into operation on May 6, and the weekly mileage will be 170,000 in excess of that scheduled for the summer of 1945. Saturday services will be much augmented, the Waterloo—Portsmouth line having two fast trains an hour each way instead of one, and the Bournemouth and West of England services being increased by 15 and 18 extra trains respectively. Similar week-end additions will take place between Victoria and the Sussex and Kent coast resorts. A faster service will be provided between Charing Cross and Folkestone by eliminating intermediate stops on certain trains. The "Atlantic Coast Express" between Waterloo, North Devon, and North Cornwall will reappear as a named train, and will be equipped with the latest Southern Railway corridor coaches. Steamship services will be improved during the summer months as more vessels are refitted after their war service. By mid-July there will be four steamers on the Southampton—Channel Islands route, as against the present one, and by mid-June the Portsmouth—Isle of Wight fleet will be increased from the three ships to five.

* * * *

Diesel Passenger Power

The success of the diesel-electric "Flying Hamburger" streamline train from 1932 onwards soon prompted inquiry as to why similar trains could not be built for service in this country. The reply of the late Sir Nigel Gresley was that similar speeds and reliability could be achieved at no greater cost with steam, and the "Silver Jubilee" and other L.N.E.R. streamliners gave a substantial measure of support to his assertion. Much has happened in the subsequent decade. The price of coal has risen steadily, and its quality has declined to such a degree that it is doubtful if the reliable timekeeping of such high-speed trains as the "Silver Jubilee" and the "Coronation" could be repeated apart from drastic changes either in fuel supply or in locomotive design. In such conditions it is inevitable that diesel-electric propulsion must make a more powerful appeal than ever before. It is now certain that before long practically every high-speed train in the United States will be hauled by a diesel-electric locomotive; already, in addition to the streamline trains which have been diesel-hauled since their inception, such famous trains as the "Twentieth Century Limited," the "Hiawatha," and many others, have been turned over from steam to diesel locomotives. In this country the G.W.R. has 38 diesel railcars in service and is planning to build more; the L.M.S.R. has turned out 80 diesel shunters to date; the next stage is the building of the first diesel-electric locomotives for long-distance work, and it will be interesting to see which railway first takes the plunge.

* * * *

Permanent Way and Signalling

The work of the civil engineer and that of the signal engineer come together in the permanent way, to begin with in the working, locking and detecting of points, where the task of securing easy movement, constant adjustment and freedom from failure under the vibration set up by the passage of heavy locomotives and trains presents difficulties, not only to those who design and instal the equipment, but to the men who have to keep it in working order. Active co-operation and a capacity and willingness to see the other man's point of view are essential to success, and it was satisfactory to hear this dwelt on by several speakers at the meeting of the Permanent Way Institution on April 10, when Mr. F. H. D. Page, Signal & Telegraph Engineer, G.W.R., opened a discussion on the subject. With the development of signalling methods the signal engineer began to attach his electric rail-contacts to the track and later to use the rails themselves for his controlling circuits, necessitating insulating fishplates being inserted in them. This was so little to the liking of some of the civil engineers of those days that a system of track circuiting was proposed—and indeed tried—in America which in-

* "L'Effort de Guerre des Cheminoto Belges." Obtainable from the Belgian Railways & Marine, 102, Eaton Place, London, S.W.1

volved no insulating joints. Much progress has since been made and the details of the various devices greatly improved. Nevertheless, as the discussion showed, there still exist some problems connected with the introduction of flat-bottom track and other matters.

* * * *

A Big End That Came Adrift

The derailment at Carcroft, L.N.E.R., on October 31, 1945, was unusual in two ways. As will be seen from our summary of Lt.-Colonel E. Woodhouse's report, a well-filled train travelling at 50 to 60 m.p.h. was derailed, but, although its greater part passed under a bridge, one coach partly overturned and the second engine did so entirely, no passenger appears to have suffered, going to prove once more how little we can judge the seriousness of an accident from the operating point of view by counting the resulting casualties. On more than one occasion a bridge has been the means of converting what might have been a mere shake-up into a calamity. Here the coaches fortunately remained in line. The cause of the accident was the coming adrift of a big end on the leading engine, which allowed the connecting rod to fall and become wedged between the stock and switch rails of a trailing connection. The details of the construction of the big end and the most probable course of events leading to its coming adrift are given at length in the report and are of much interest. Colonel Woodhouse, however, although making some suggestions as to the particular design involved, considers that the accident may fairly be regarded as mainly due to the difficulties that arose during the war in maintaining railway equipment.

* * * *

Improving Combustion of Locomotive Coal

At a recent meeting sponsored jointly by the Railroad & Fuels Divisions of the American Society of Mechanical Engineers, a paper was presented by Mr. A. A. Raymond, Superintendent of Fuel & Locomotive Performance of the New York Central Railroad. Considerable space was devoted by the author to the difficulty of keeping incrustations of slag off the tubeplates and out of flues and tubes, as slag formation constitutes one of the chief limiting factors in the service which locomotives can be expected to give. The trouble is especially severe when (as so often happens in the U.S.A.) locomotives have to work at maximum output over long distances. Various forms of deflectors and traps were tried in attempts to minimise the formation of slag. The most effective was found to be a "baffle arch" of the usual American grade of refractory bricks. The baffle, which extends across the underside of the firebox crown, above the normal brick arch, is supported by water-filled tubes, and causes slag particles to be diverted downwards to the region where the firebox proper ends and the combustion chamber begins. To prevent the choking of the lower rows of tubes by these particles an additional "slag accumulator wall," of high-temperature refractory brick and mortar, is constructed across the bottom of the combustion chamber, about 20 in. from the tubeplate, resting on the floor of the latter, and having a height of some 15 in. and a thickness of 9 in. Mr. Raymond feels that consideration might be given to moving grates (as in stationary practice) for locomotives, carrying a thin fire for high rates of evaporation.

Railway Results for 1945

THE Government White Paper* which is reproduced elsewhere in this issue indicates clearly that 1944 was the peak year of the railways' war activities, as for the year ended December 31, 1945, the gross receipts of the controlled undertakings totalled £383,881,000, a decrease of £10,479,000 compared with 1944. Expenditure, however, reached the record figure of £316,982,000, an increase of £15,815,000 over the previous year. The deficit in the net revenue as the result of the operation of ancillary businesses (such as steamboats, docks, hotels, collection and delivery services, and the delivery of parcels and goods) and rents, interest, and other miscellaneous items increased by £1,415,000 to £4,352,000, with the result that the net revenue totalled £62,547,000, which is a drop of £27,709,000 as compared with 1944. The fixed annual sums payable by the Government to the controlled undertakings amount to £43,469,000 and the net revenue remaining in the pool after payment of these sums accrues to the Exchequer. Thus, as will be seen from the table reproduced below, the railway control account yielded £195,277,000 to the Exchequer for the five years 1941-1945 inclusive, as compared with £217,345,000 which was paid to the controlled undertakings during that period.

The White Paper shows that passenger train earnings reached a record figure of £210,556,000, an increase of £15,918,000 compared with 1944, and freight train receipts dropped by £26,403,000 due to the termination of war contracts. Miscellaneous receipts at £3,662,000 showed a trifling increase over 1944. No indication is given of the reasons for the continued rise in railway expenditure despite the substantial drop in traffic, but obviously the two principal factors were increased wages and the rise in the price of locomotive coal.

So far as the arrears of maintenance are concerned, under the Railway Control Agreement the charges for maintenance (including renewals) are standardised on the basis of the average pre-war charge adjusted for variations in assets in service and in price levels, and are borne as pool expenses. When, as has been the case for the last five years, the actual maintenance expenditure of any of the controlled undertakings is less than the agreed standardised charge, the difference, which represents the estimated cost of the arrears of maintenance, is paid into a trust fund set up under Article 19 of the Railway Control Agreement.

The amounts in the trust funds of the five undertakings concerned increased during 1945 by £21,004,000 in respect of arrears of maintenance, etc., and £1,456,000 in respect of interest, and at December 31, 1945, they totalled £148,220,000, as compared with £125,760,000 on December 31, 1944, an increase of £22,460,000. This compares with an increase of £32,523,000 in 1944, but it does not necessarily follow that more maintenance and renewal work was carried out in 1945 than in 1944, as the balances in the funds have to be revalued periodically to take account of variations in assets and, what is probably more important, variations in price levels. Incidentally, a study of the figures shows sub-

* "Government Control of Railways." Cmd. 6797. H.M. Stationery Office Price 1d.

ESTIMATES OF POOLED REVENUE RECEIPTS AND EXPENSES AND NET REVENUE OF THE CONTROLLED UNDERTAKINGS

	Year ended December 31				
	1941 £	1942 £	1943 £	1944 £	1945 £
Receipts and expenditure of the controlled railway companies and joint lines in respect of railway working and of the London Passenger Transport Board in respect of railway working and road services :					
Receipts : Passenger	132,106,000	163,544,000	186,281,000	194,638,000	210,556,000
Freight	158,826,000	176,658,000	190,908,000	196,666,000	169,663,000
Miscellaneous	2,903,000	3,285,000	4,490,000	3,656,000	3,662,000
Total	293,835,000	343,487,000	381,679,000	394,360,000	383,881,000
Expenditure	226,636,000	251,715,000	272,247,000	301,167,000	316,582,000
Net receipts	67,199,000	91,772,000	109,432,000	93,193,000	66,899,000
†Other receipts and expenditure included in the pool (net)	Dr. 2,074,000	Dr. 2,646,000	Dr. 3,864,000	Dr. 2,937,000	4,352,000
Net revenue of the pool	£65,125,000	£89,126,000	£105,568,000	£90,256,000	62,547,000

† This item includes the net revenue from ancillary businesses (such as steamboats, docks, hotels, collection and delivery of parcels), and rents, interest and other miscellaneous items

Note.—The fixed annual sums payable by His Majesty's Government to the controlled undertakings amount to £43,469,000

stantial variations in the percentage increases in the trust funds of the five undertakings compared with the position at December 31, 1944.

* * * *

The Choice of Electric System in France

WITH the continued extension of main-line electrification in certain Continental countries, and the proposal to convert a considerable mileage, at present steam operated, in the next ten years or so, it is not surprising to read, from time to time, discussions on the ever-present question of choice of system, something which must inevitably be discussed when through running is brought into the picture. It was unavoidable that several different systems of electrification should find practical application and that each should find engineers of repute to speak in its favour. In the course of time the choice of possible systems for main-line work has been narrowed, but even today several methods of operation are in use, each giving, on the whole, very satisfactory results. It is admitted by all competent judges that each has its advantages and disadvantages and that not only technical but economic, and even political, considerations must play a part in deciding what should be done in any given instance.

Without going into the arguments involved in any detail, which would occupy a great deal of space, we may note the general tendency today to adopt d.c. systems and the restriction of a.c. systems to those areas—or in some cases, as in the U.S.A. railway systems—where they have already found fairly extensive application. Of the a.c. systems, the single-phase with high voltage—not less than 11,000 volts, and usually more—is the only one that is likely to remain; the 3-phase, scarcely used much at any time outside Italy, doubtless will disappear, and that country, in fact, adopted the 3,000-volt d.c. system for new work. Except where the third-rail system for good reasons is preferred, the choice among d.c. systems now lies between 1,500 and 3,000 volts at the contact wire.

In France, the principal main-line electrifications in operation used 1,500 volts d.c. and the equipment gave much satisfaction. The advantages of the 3,000-volt system, however, were appreciated, and when the electrification of the former P.L.M. main routes was being investigated, the question of choice of system again arose. The 15,000 single-phase system—standard in the countries associated with the " Verein " and ably developed there—was weighed against the two d.c. arrangements just mentioned, and the main arguments involved have been dispassionately set forth in the *Revue Générale des Chemins de fer* by Monsieur A. Floc who is on the main technical staff of the S.N.C.F. It may be mentioned that many French engineers have been congratulating themselves on the fact that their country, although responsible, on the former Midi routes, for some single-phase working, had not adopted it as a national system, as it is certain that the Germans would have removed the stock and equipment to their own routes to replace their losses there.

Apart from this, however, to use the single-phase system would have made French manufacturing firms largely dependent on licences from abroad. The single-phase system, despite some recognised advantages, therefore was not thought suitable, but serious consideration was given to the use of 3,000 volts on the contact wire on the south-eastern routes. In itself, undoubtedly, it would have given noticeable advantages over the 1,500-volt system, but a number of practical difficulties presented themselves, to overcome which was far from easy. Junction points between the two voltages would have to be arranged, with dead sections between the systems, and at times special arrangements for changing voltage on certain stretches by switch-gear interlocked with the signals. This change of voltage in some cases would have to be made over 100 times daily. Inter-running of the two types of motive stock would be difficult and, in some cases, impossible, and the dead sections would prove extremely awkward when wrong-line working was necessary, or when operating under the stop-and-proceed rule with automatic signals, the use of which is being greatly extended in France.

For these and other reasons, some economic, the conclusion was reached—after a very thorough investigation of the merits of the case—that the introduction of another voltage was not justified and that the routes to the south-east of Paris ought to be equipped on the system already used on the other main lines. At the same time, Monsieur Floc, who puts the whole case with great impartiality, recognises that there is something to be said for adopting different arrangements on secondary lines of comparatively light traffic—the single-phase system is in use on several such in Switzerland—and that some new developments in the direction of producing 50-cycle equipment for a.c. operation, or applying rectifiers to the 3-phase-single-phase conversion, may eventually materially affect the position.

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Canadian Pacific Railway Company

A RECORD volume of transport service was achieved by the Canadian Pacific Railway Company in 1945, the passenger and freight train mileage exceeding the figures for 1944, which themselves had surpassed the previous records of 1943. Although the flow of freight traffic for war purposes ceased, new sources were provided by the reconversion of industry, the relief and rehabilitation requirements of Europe, and the repatriation of Canadian servicemen. Freight service train-mileage was 35,016,268, against 35,114,904, but passenger train-miles went up from 20,585,698 to 20,794,392, the total of 55,810,660 in 1945 comparing with 55,700,602 in 1944. Gross earnings from freight, passenger and incidental railway services, at $316,109,358, were barely 1 per cent. less than the record figures of 1944, but the net earnings of $36,054,334 were substantially less owing to higher costs, which rose from $275,711,370 to $280,055,024. The proportion of net earnings to gross earnings was smaller than at any time in the past. Payrolls charged to operating expenses took $133,592,959, or 42 cents of each dollar earned, as against 41 cents in 1944, and 47 cents of each dollar, compared with 45 cents in 1944, were required for material, supplies, taxes, and other expenses.

Income from other than railway sources increased by $2,735,642 to $15,106,957. All ocean-going steamships and one coastal vessel remained throughout the year in operation under charter to the United Kingdom Government. Net earnings from this source, at $2,062,965, showed an increase of $2,735,642. Hotel net earnings were better than in any previous year, being $645,024 higher, and together with increased Communications Department earnings gave a total of $2,333,877. Income received from Minneapolis St. Paul & Sault St. Marie income bonds, which were acquired by the company through reorganisation of the Soo Line in 1944, amounted to $137,652. The C.P.R. now owns 49·94 per cent. of the capital stock of that system, and the traffic agreement therewith, executed in 1944, has been extended for a period of eight years beginning January 1, 1951. Dividends declared out of the year's earnings absorbed $21,781,500. The 4 per cent. dividend on the preference stock and 5 per cent. on the ordinary stock were the same as in the previous year. General financial results are compared in the table below:—

	1944	1945
	$	$
Freight earnings	233,118,473	227,707,486
Passenger earnings	56,310,130	56,854,297
Gross earnings	318,871,034	316,109,358
Working expenses (including taxes)	275,711,370	280,055,024
Net earnings	43,159,664	36,054,334
Other income	12,371,315	15,106,957
Total income	55,530,979	51,161,291
Fixed charges	20,831,149	19,547,129
Net income	34,699,830	31,614,162
Preference dividend	5,042,782	5,031,500
Ordinary dividend of 2 per cent., paid October 1, 1945	6,700,000	6,700,000
Balance to profit and loss ...	22,957,048	19,882,622

To the total working expenses already quoted, maintenance expenses contributed $118,155,208, or 37 cents out of every dollar of railway earnings. Expenditure was principally on repairs and renewals to track, structures, motive power, and rolling stock. The abnormally heavy use of the company's equipment and facilities throughout the year made it impossible to maintain them at pre-war standards, and a provision of $5,250,000 is made in the accounts for deferred maintenance. During repairs of rolling stock, the opportunity was taken of carrying out improvements, such as the provision of modern air brakes on 1,457 wagons, and the substitution of direct lighting generator drives for belt drives on 62 coaches. Efficiency of operation was well maintained, as shown by the following figures:—

	1944	1945
Freight train load, gross tons ...	1,785	1,790
Freight train speed, m.p.h.	16·2	16·1
Freight car miles per car day ...	47·8	48·2
Gross ton-miles per freight train hour	28,913	28,873
Passenger-miles per train-mile ...	141	138

The operating ratio, including taxes, was 88.59 per cent., an increase of 2.13 per cent. Many of the statistics in the report are presented in diagrammatic form, and the textual matter is illustrated with a number of sketches, which make it a very readable document.

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U.S.A. Railway Passenger Services

THE division of railway operating expenditure between passenger and freight services is a difficult feat of accountancy—so difficult that in this country a solution of the problem is not attempted. The Americans, with their genius for calculating, have not shirked the issue. The Interstate Commerce Commission publishes an annual estimate of the net operating revenue derived separately from passenger business. Frequently critics have queried the basis on which costs are charged against passenger operations, but the financial results specified independently for the passenger and freight departments conform pretty closely to traffic trends over a long period of years. Thanks to the statistical practice of the I.C.C., the history of U.S.A. railway passenger services between the two wars, or from 1920 to 1940, can be stated in 12 lines of figures. Here is the table.—

	1920	1940	Per cent. decrease from 1920
Passengers carried	1,234,900,000	452,900,000	63
Passenger miles	46,849,000,000	23,762,000,000	49
Passenger train miles	567,705,000	391,597,000	31
Passengers per train	82·5	60·7	26
Passenger car miles	3,637,225,000	3,011,639,000	17
Passenger coaches	42,900	29,136	32
Passenger operating revenue ...	$1,702,300,000	$634,858,000	62
Revenue per passenger mile ...	2·75 cents	1·75 cents	36
Passenger operating expenses ...	$1,444,300,000	$780,160,000	46
Net passenger revenue	$258,034,000	Def. $145,302,000	—
Passenger operating ratio ...	85 percent.	123 per cent.	—
Gross weight of passenger train (excluding locomotive) ...	400 short tons	533 short tons	—

The statement is a remarkable record of the evanescence of railway passenger travel in the wealthiest country in the world. In 1920 passenger train services earned 2·75 times the net revenue contributed by freight traffic. The volume of travel decreased so rapidly during the next 10 years that there was a deficit of $16,000,000 on passenger working in 1930, in contrast to a huge profit of $1,350,000,000 accruing from freight services. At the end of another decade the passenger deficit was $145,000,000, and the net freight revenue was much the same in 1940 as in 1930. The coming of war changed things completely. For the year 1944 railway passenger miles were quadrupled, motor-bus transport was almost trebled in volume, and air carriers flew twice the total distance covered in 1940, and the running of private motor cars was restricted drastically. The abnormal and artificial boom in public passenger transport is expected to spend its force this year and to subside entirely by the year 1950. What is the outlook for the railways in the after-war period of intense competition that lies ahead?

The railways hope to counter their rivals by speeding up train schedules and extending modern facilities such as air-conditioning of coaches. Many of the lines put their trust in diesel-electric "streamliners" which have been installed between numerous important centres since 1934. These measures may retain traffic on popular routes, but involve a good deal of capital expenditure as well as adding to capital costs. The last entry in the table given shows that the weight of the typical American passenger train increased by one third between 1920 and 1940. Yet the number of passengers on board decreased by 26 per cent. during these twenty years. Each passenger, moreover, was carried farther, but paid less for his journey. The cold light of statistics shows that, during the five years before the war, any gain from diesel-electric and other accelerated services failed to offset the continuous loss of passengers from the ordinary railway trains throughout the States. The private motor-car was responsible for much of the leakage. Americans like to ride "on rubber." They have the money to replace their cars as soon as the motor industry gets into full production again, so that a great increase in "automobile mileage" is to be expected to the detriment of railway carryings. Simultaneously the development of civil aviation may abstract valuable traffic from long-distance rail services, as a comprehensive system of airports is being constructed with financial aid from the Federal Government.

When all relevant factors have been weighed up, one can be more confident about the future of the American railways as transporters of freight than of their success as passenger carriers. In the worst years of trade depression after the collapse of October, 1929, net operating revenue from freight never fell below $826,600,000. The freight operating ratio was reduced from 98 per cent. in 1920 to 63 per cent. in 1940, whereas the passenger operating ratio moved in the wrong direction until it stood at 123 per cent. in 1940 as compared with 85 per cent. twenty years earlier. Freight services were operated over 227,000 miles of first track in 1940, but passenger trains were run only 162,000 miles. Passenger train mileage, main line and suburban, was 90,000,000 miles less than the freight train mileage and, despite the excellence of the crack passenger services, the predominance of freight traffic in the United States seems likely to be more marked as time goes on.

At present the railways are making a great effort to develop long distance passenger travel. Through coast-to-coast sleeping car services were inaugurated on March 31 by the New York Central, the Pennsylvania and the Baltimore & Ohio, in conjunction with the Santa Fe, Chicago & North Western, Union Pacific and Southern Pacific. That was a historic innovation. Other timetables for establishing through sleeper services are being prepared, so that passengers can travel undisturbed across the States instead of changing at Chicago or St. Louis. Early in March the New York Central also agreed with the Pennsylvania to restore the pre-war schedules of the "Twentieth Century Limited" and the "Broadway Limited" as from April 28. These expresses will run again between New York and Chicago in 16 hours. A general acceleration of important main-line services may be expected to follow these first steps to quicken journey times. It will be instructive to watch the outcome of the campaign which the railways have started after a thorough study of the passenger transport situation.

Publications Received

Your New Job.—By Kenneth Dick. Gramol Publications Limited, London and Chesham, 4 in. × 6½ in., 48 pp., price 1s. 6d.—This is a useful guide to the employer whose staff is returning from the Forces, or who wishes for guidance in the recruitment of staff with technical qualifications, and to the service man who will shortly be demobilised and who wishes to know how he stands in relation to his employer in the matter of returning to his previous employment, or what facilities are available for securing new employment, and the training which is available to enable him to qualify for it. The booklet gives an excellent summary of all the salient points relating to a considerable number of occupations, including the personal qualifications necessary, the cost of training or acquiring a position in the industry, and the rates of pay and prospects of advancement in them. It is written in an attractive conversational style.

Automatic Splineshaft Regrinding Machines.—We have received from the Churchill Machine Tool Co. Ltd., Broadheath, near Manchester, an illustrated descriptive brochure covering three sizes of splineshaft grinding machines. The effect of automatic sizing is derived from the maker's method of operating the downfeed of the grinding wheel by a single lever (which eliminates the need for resetting the grinding wheel after each retrueing) in conjunction with a triple trueing device. The latter feature involves the movement of three diamonds across the grinding wheel to give the full form of one recess of the splined portion of the work, the diamonds being set by an appropriate gauge. An automatic dividing head, driven by an independent motor, gives accuracy of indexing within 0·0001 in. circumferentially.

More Coal.—Under this title the Westinghouse Brake & Signal Co. Ltd., Chippenham, Wilts., has brought out a brochure describing and illustrating a series of appliances designed to assist in the safe and economical working of collieries. The apparatus dealt with in this publication covers examples of decking apparatus, etc., and devices for ensuring the quick and automatic operation of air-lock doors, gates, and tub retarders.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

"County" Locomotive Names on G.W.R.

Bristol Railway Circle,
33, Upper Belgrave Road,
Clifton, Bristol, 8. April 7

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I read with interest in "The Scrap Heap" of your April 5 issue that locomotives of the Great Western Railway "1000" class are to be named after counties.

In a letter which I wrote to you on October 15, 1944 (and published in your issue of October 27 of that year), I expressed the hope that both "City" and "County" names again might be used on G.W.R. engines—preferably as a change from "Halls," "Granges" and "Manors"—and, although I cannot presume to think that my letter carried any weight with the Chief Mechanical Engineer's Department at Swindon, I am none the less pleased that a mere "layman's thoughts" are (in part, at any rate) to find expression in "official practice"!

I note that five counties are included which are not actually in Great Western territory, but this is doubtless to make up the number required.

Yours faithfully,
RALPH L. WILKINS,
Editor, *Bristol Railway Circle Magazine*,
& Publicity Officer

"The Railway Gazette"

London, N.W.3.
April 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The "leaders" in your April 12 issue are a refreshing vigorous lot. The criticisms of the Government and its ways are perfectly fair. Home railway traffics are well set out, but why not complete the good work by showing the percentage total decline? It is interesting to see that total receipts are down 15 per cent. for the four weeks ended March 24, while the drop from January 1 is 9 per cent. The editorial on "How New Industries Arise" makes a point that is of importance in connection with all the talk about location of industry. Most of our industries have grown spontaneously. Both Rowntree's and Cadbury's cocoa works sprang from small shops and didn't extend a great deal until the 1880s. The Board of Trade now talks as though a trader knew today what his business was going to be 20 years hence. Most of the industrialists have vague ideas about the future and are content to feel their way forward from year to year.

One hopes that the railways are not making a mistake in promising so much for summer. Their programmes make the current lamentations about ancient engines, tattered carriages, broken-down wagons and bad coal look rather silly, not to mention shortage of staff. The general articles are all good. So is the portrait of D. Blee, who has obtained his post at the right age. For the country's sake we want good railwaymen under 50 coming along into big posts.

Yours faithfully,
HEATHMOUNT

Thank You, Rail Staffs!

National Canine Defence League,
8, Clifford Street, New Bond Street, W.1. April 9

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—May we thank, through your courtesy, the railway staffs who have been making it possible for dogs in transit to survive the rigours of long railway journeys during the last few years? These men and women receive no extra reward for feeding and watering these canine pilgrims and giving them kindly words on journeys that often unnerve and sometimes terrify them.

The senders of these dogs have not always the sense to choose the best train; they even pack half-grown puppies in boxes more suitable for ferrets. Last week we found three spaniels drenched with moisture, half-suffocated, desperately thirsty and hungry, packed in poorly ventilated boxes with splinters sticking out of the few crudely punched air-holes. They had travelled 100 miles to London, where the railway staff took pity on them, wrenched open the nailed-down lids, and gave them every care. These unhappy dogs had then to be transhipped to another London terminus, thence to travel 220 miles to the West Country. The whole journey could not be done in less than 22 hours, yet the sender had made no request on the label or otherwise for the spaniels to be exercised, fed or watered *en route*.

Dog-owners often grumble about railway delays when they themselves are to blame, and the railway workers are left with the task of clearing up the mistakes of the senders. Even if the latter are not grateful, the dogs certainly are.

Yours truly,
CHAS. R. JOHNS
Secretary

Railway Questions and Answers

41, Drummond Drive,
Stanmore. April 10

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—As a railway employee with 37 years' service I would say that the statements by the British main-line railway companies under the above head in the issue of March 1 are misleading and gross exaggerations. In my own grade, I have seen little evidence that promotion is by merit, neither have I knowledge of any published or recognised scheme whereby men in the lower ranks of that grade have been given special opportunities to qualify for promotion as a result of their abilities; neither is it my actual experience.

There is no evidence to show that State control would not improve the chances of promotion or reward of railway workers.

Yours faithfully,
STAGNATUM

L.N.E.R. Locomotive Rebuilding

c/o Tn. Directorate, H.Q. Allied Land Forces,
South East Asia Command. March 29

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In view of the extensive correspondence on this subject since Mr. Arthur F. Cook's original letter, his second letter, published in your March 8 issue, is of particular interest, dealing at considerable length with the performance of engines rebuilt by Mr. Thompson.

Comparing the work of the "B1" and "B17" engines, which are to all intents and purposes new, with those of the standard "B17"s, in their present state of maintenance, does not take into account some of the best work performed by them when in good condition in pre-war days, especially on the G.C. Section of the L.N.E.R. No doubt the "B1" 4-6-0 can equal the work of the three-cylinder engine at speeds of, say, 40 m.p.h. and below, but these are hardly those normally run in passenger traffic.

Perhaps I may encroach on your limited space to mention a few of the best performances put up in pre-war days, which, although certainly above average, demonstrate in no uncertain way the capabilities of the "Sandringham"s. The most exceptional of those of which I have knowledge was a minimum of 39 m.p.h. at the top of the six miles at 1 in 117 of Wendover bank with a 465-ton train on one occasion, closely succeeded by 60 m.p.h. up the Brackley bank of 1 in 176 with 360 tons, and a sustained 45 m.p.h. with 300 tons on Amersham bank, inclined at 1 in 105 (the last-mentioned on 30 per cent. cut-off). One can hardly imagine either of the two-cylinder types mentioned improving on such feats, although both have a working pressure higher by 25 lb. per sq. in.

At the same time, it may well be that the number of 4-6-2 and 2-6-2 engines available may relegate the "B17"s to more local work, where the advantages of three-cylinder propulsion are less, and here the "B1" mixed-traffic engine would be the most suitable for such duties.

In his more general remarks Mr. Cook mentions the rough riding of certain Gresley classes, which is certainly common knowledge, but cannot in any way be held up as a claim that two-cylinder machines have any advantage in riding qualities over multi-cylinder machines. Alterations in the springing of the "B1" and rebuilt "B17" engines from those of the original "B17"s must be responsible for their improved riding. In the majority of two-cylinder 4-6-0 designs the riding is distinctly rougher than those of roughly comparable size fitted with three or four, as would appear likely with the less even torque and greater difficulty in balancing the reciprocating parts.

Although, as I stated in my previous letter, the advantages of multi-cylinder engines only appear pronounced in machines where additional power cannot be provided by the use of two cylinders, or for those generally employed on duties calling for continuous power output at high speeds, the Gresley conjugate motion seems to have much to advocate its use on three-cylinder engines. It is certainly true in theory that this gear tends more readily to incorrect valve events than the independent set of motion provided for the inside cylinders of other designs, although this can hardly be a weighty argument in view of the reliability of the 4-6-2 and 2-6-2 engines in times when they received adequate maintenance, which presumably will return. In this connection one recalls the continuous service put in by the Pacifics on the "Coronation"

and "Flying Scotsman" expresses and the speed achievement of *Mallard*, which hardly indicate either weakness or bad steam distribution.

The advantages of the Gresley gear are twofold, in that it obviates the necessity for installing an additional set of motion in an inaccessible position between the frames, with consequent difficulty of maintenance and increase in engine weight, and facilitates direct steam distribution to all cylinders with divided drive, which is more difficult when the inside cylinder is set well forward as in the Pacific rebuilds, where the wheelbase has had to be increased in consequence.

Although its use abroad has not been extensive, the Gresley gear is in use on a number of metre-gauge Pacifics of the Federated Malay States Railways, and on the large "D50" class New South Wales 4-8-2 locomotives, of which further examples are under construction with this type of gear. Its application in the latter case to a heavy mixed-traffic design is certainly of note in view of the original engines of this class dating back some fifteen years.

It would seem from the foregoing that the Gresley conjugate gear has several advantages over the more orthodox arrangement for three-cylinder engines, which involves an increase in weight comparable with that of providing a four-cylinder machine with two sets of motion operating the inside valves by rocking shafts. As such it can hardly be dismissed as an unnecessary refinement of design, although its use is not widespread outside the L.N.E.R.

Although from the point of maintenance, refinements of design have to be balanced against increased costs, there seems a general reluctance to adopt many features of locomotive design in England which have for several years been standard or widely used in Europe and America, such as thermic syphons, poppet valves, drop gates and hopper ashpans, all of which appear to have proved their worth by widespread use in the countries mentioned. It is noteworthy that the late Sir Nigel Gresley always showed willingness to lead in the installation of these and other modern devices on his designs, although in some cases discarding them as a result of experience, which hardly suggests that his conjugate valve gear was adopted on a large scale without decided advantages in its favour.

It may well be true that many modern refinements in design are accompanied by higher costs and require more specialised maintenance, restricting their use to certain specialised locomotive types, but it is only by this means that the efficiency of the conventional locomotive can be appreciably raised, as has been shown by the Chapelon rebuilds in France and the results attending the use of Franklin poppet valves in America, also the success of the Bulleid Pacifics on the Southern Railway, which embody many novel features, the use of which has been vindicated by their exceptional performance.

Yours faithfully,

G. W. CARPENTER,
Captain, R.E.

"London School of Economics at its Worst"

96, McIntyre Road,
Worcester. April 15

To the Editor of The Railway Gazette

Sir,—The implication made in your editorial paragraph in the April 12 issue, that capital and administration are the predominant factors in modern economic organisation, is hardly correct. A more equitable redistribution of wealth will not necessarily decrease production, and the effect of the Budget concessions, and also the Income Tax reduction which has recently come into effect, will be to encourage many workers to increase their output. It is easy to forget that enterprise and greater productivity can be induced in sections of society other than those to whom the Budget makes such little appeal.

Yours truly,

J. C. BUTTON

Steel Mineral Wagons

Charles Roberts & Co. Ltd.,
Railway Wagon Works, Horbury Junction,
Nr. Wakefield. April 15

To the Editor of The Railway Gazette

Sir,—It has been recently stated in the Press that an American company has granted an exclusive licence to a Scottish steel firm for the manufacture in this country of steel known as "Cor-Ten." The report goes on to state that a considerable proportion of British production will be earmarked for the construction of railway wagon stock, and certain claims are made with regard to corrosion and reduction in tare weight.

Permit us to point out that it must not be assumed that the Americans are doing anything better than we can do in this country. We have collected a great deal of evidence with regard to the action of deleterious "coal" water on these steel vehicles over the last 25 years, and we shall be pleased to give that information to any persons who may be interested in this subject. We should like your readers to withhold judgment until all the facts can be made public.

We contend, and our experience proves, that steel mineral wagons, properly designed and constructed, using ordinary British commercial mild steel, 28/32 tons tensile, will give all the results needed, and we should imagine that the Great Western Railway Company, at Swindon, who has been building all-steel wagons for at least fifty years, would be able to corroborate this statement.

Yours faithfully,

DUNCAN BAILEY
Chairman & Managing Director

M.R. University Course on Economics

25/2, Southend Road,
Beckenham, Kent. April 11

To the Editor of The Railway Gazette

Sir,—I beg to draw your attention to an error in your April 12 issue. It appears in your account of the career of Mr. E. Falconer, lately retired from the service of the L.M.S.R.

It is stated that "he also occupied first place in the special two years' course on economics, arranged under the auspices of the Sheffield University for Midland Railway Staff." During the two years' course I took the first place for the first three papers set, and was then asked to "ease off"; but at the end of the two years the list supplied to the Chief Goods Manager was shown to me by the Chief of Staff, and I can assure you that I was definitely No. 1. I believe Mr. Falconer was second, but of this I am not certain.

It is hardly likely that the list of the men named is in the archives of the old Midland today, as the matter under notice dates back some 35 years, which may account for the error.

Yours faithfully,

J. L. CLEWES

Naming of Locomotives

150, Broomielaw,
Glasgow, C.2. April 17

To the Editor of The Railway Gazette

Sir,—With reference to "The Scrap Heap" in your esteemed issue for April 12, I notice the L.N.W.R. and G.W.R. get credit for the "Naming of Locomotives" up to grouping, and only they. What about the North British? The N.B.R. (of happy memory) had the full run of Scott's "Waverley Novels" and some dandies there were—and still are—on those grand old engines.

Of course the "Scrap Heap" is in jocular vein—long may it reign! "Tailpiece" hit off "nationalisation" to a tee. One of my own is appended:—

Tailpiece

Let the distant be at "clear"
Let those "planners" but appear
Then warn them OFF:
"Trespassers are not wanted here"
(What though they scoff)
The nearing thunder's in their ear
And that's ENOFF!

Yours sincerely,

JOHN M. SCOTT

The Bourne End Accident, L.M.S.R.

Cheltenham. April 17

To the Editor of The Railway Gazette

Sir,—I think that the majority of signalmen will be in disagreement with your correspondent's opinion [see our April 12 issue.—Ed., *R.G.*] and in full agreement with the conclusion arrived at by the Chief Inspecting Officer of Railways.

In the case of the Slough, G.W.R., accident of many years ago, when a Paddington express crashed into a Windsor race special which was standing at the down main-line platform—the driver of the express having passed three or four lots of signals at danger—the conclusion arrived at, at the inquiry then held, was that the driver of the express must have been suffering from "mental aberration." Is it just possible that in the case of the Bourne End, L.M.S.R., accident, the driver affected might have been suffering from some such similar trouble?

Yours faithfully,

R. H. NICHOLLS

The Scrap Heap

A "Golden Arrow" Criticism

Opinions may differ as to the wisdom of building in these austere days a Golden Arrow train even more "sumptuous" than its predecessor, and of trumpeting abroad the luxury of its furnishing, but surely the limit of reason is passed by the provision, for a run of an hour and 40 minutes, of a "cocktail-car." I write as one who has received many courtesies from the Southern Railway, but who cannot but deplore the name given to this car: "The Trianon Bar." Could ineptitude go further?—*Mr. Grant Richards in a letter to "The Times."*

* * *

Transport in 1818

A correspondent, Mr. F. Plant, sends us the following extract from the *Staffordshire General & Commercial Directory*, published in 1818:—

Coaches from Different Inns

FROM THE SWAN INN

Mail to Birmingham at nine in the morning; to Manchester at three in the afternoon.

FROM THE STAR INN

The Mail to London every morning at seven o'clock; to Chester and Holyhead at half past three in the afternoon.

FROM THE GEORGE INN

The *Bang-up* to Liverpool at quarter past ten in the morning; Birmingham at a quarter past four in the afternoon.

The *Regulator* to Liverpool every Sunday, Tuesday and Thursday, at a quarter before eleven in the forenoon; to Birmingham same days, at half past three in the afternoon.

FROM THE WHITE BEAR

Eclipse to Manchester every morning at half past eleven; to Birmingham every afternoon at half past two.

LAND CARRIAGE

J. and W. Ashmore from their Warehouse, Gaolgate, to Bristol, every Monday, Thursday and Saturday; to Manchester every Tuesday, Thursday and Saturday.

T. and M. Pickford & Co. daily to all parts of the kingdom.

Thomas Ellsmore, from the New Maid's Head, to Uttoxeter every Tuesday and Saturday.

Ackers, from the Old Maid's Head to Penkridge and Wolverhampton, every Tuesday and Saturday.

Thomas Ward, from the Vine Inn, to Wolverhampton every Tuesday and Saturday.

Thomas Millward, from the George Inn, to Eccleshall, every Saturday.

Richard Hall, from the White Bear, to Newport every Monday.

John Barratt, from the Old Maid's Head, to Gnosall, every Wednesday and Saturday.

J. Ling's Waggons convey and forward Goods regularly to London, Manchester, and all parts of the kingdom.

Half a Decision on Steel

The industrial world, which had been led to expect a straight decision from the Government on plans for the iron and steel industry, will be dismayed by the statement by the Minister of Supply. The policy amounts to control without a plan and without as yet any idea of a controlling body, followed by nationalisation of something to be hereafter defined on a policy still to be formulated. The industry and all its customers and associated industries will be left in the greatest possible uncertainty for the longest possible period.—*From "The Times" City Notes.*

* * *

100 YEARS AGO

From The Railway Times, *April 25, 1846*

MIDLAND RAILWAY.—The Directors of the Midland Railway are prepared to receive tenders for the erection of an additional Engine-Shed and Tender-Repairing-Shops, at the Derby station.

Specifications and conditions of contract may be seen at the office of the Resident Engineer, at the Derby station, on and after Thursday, the 23rd instant, between the hours of 9 a.m. and 5 p.m., until Monday, May 4th.

Tenders, inclosed in sealed covers, marked "Tender for Engine-house and Workshops," and addressed to the Secretary, must be delivered at the Derby station on Tuesday, the 5th of May, not later than Ten o'Clock.

Printed forms of tenders and covers may be obtained on application at the Company's Office, Derby station; and no tenders which are not according to these forms will be received.

Parties tendering, or their agents, must attend.

The Directors do not bind themselves to accept the lowest tender.

GEORGE HUDSON, Chairman of the Board of Directors.
JOHN ELLIS, Deputy Chairman.
By order,
J. F. BELL, Secretary.

Derby, April 7th, 1846.

LONDON AND SOUTH-WESTERN RAILWAY.—From an anxious desire to meet the public convenience, and with a view to placing the varied advantages of their railway, in respect both of business and pleasure, more within the reach of every class of the community, the Directors of this Company have resolved, on and after the 1st of May ensuing—

To increase the number of the trains, and to accelerate their speed, and vary the hours of departure and arrival of many of them.

To carry second-class passengers with their express trains.

To abolish their slow trains altogether; and to convey third-class passengers, at the Parliamentary fares, with their ordinary trains, four times a day each way, and at hours to allow of an early departure and late return to and fro.

To make the following great reduction in their fares throughout:—

Express train—	First-class	reduced to	20s.
,,	Second-class	,,	17s.
Fast train	First-class	,,	17s.
,,	Second-class	,,	14s.
Mixed trains ..	First-class	,,	14s.
,,	Second-class	,,	10s.
Third-class at.....			6s. 6d.

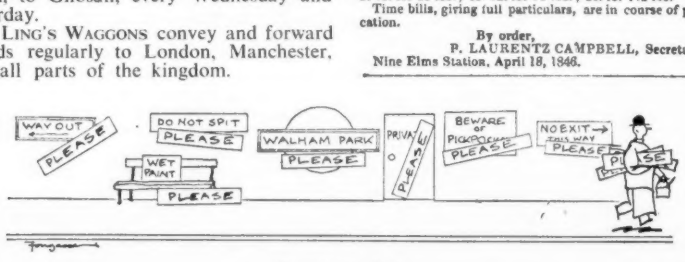
* By an arrangement with the Floating Bridge Company, the omnibus fare between Gosport and Portsmouth is reduced from 1s. to 6d. each passenger, including the same weight of luggage as allowed by the Railway Company. First-class, 112 lbs.; second-class, 84 lbs.; third-class, 56 lbs.

Steps are in progress to increase the convenience of passengers proceeding by steam to France, the Channel Islands, the Southern Coast, and the Isle of Wight. This route to France, although somewhat longer, is by far the most certain and secure, from their being good harbours for departure and arrival at both ports.

Parcels will be carried at a greatly reduced scale, the throughout charge between Southampton, Gosport and London, including delivery, by passenger trains, being fixed at 1s. for 28 lbs.; 1s. 6d. for 56 lbs.; 2s. for 112 lbs.

Time bills, giving full particulars, are in course of publication.

By order,
F. LAURENTZ CAMPBELL, Secretary.
Nine Elms Station, April 18, 1846.



Courtesy drive

[Reproduced by permission of the proprietors of "Punch"

* * *

Next Week's Railway Centenaries

Blackpool branch (3¼ miles), Preston & Wyre Railway, opened on April 29, 1846.

Stratford to River Lea (Canning Town) (2½ miles), Eastern Counties & Thames Junction Railway, opened on April 29, 1846.

* * *

"The Man Behind Rail Nationalisation"

Mr. S. S. Wilson, £1,500 a year Civil Servant, is the man behind the plans for nationalisation of the railways and road transport.

He is one of the heads of a "hush-hush" shadow department created at the Ministry of Transport, where the framework and details of the Government Bill—due to come before Parliament in the next session—are being worked out.

Ministry wags call it the "S.S." division, after Mr. Wilson's initials.

Officially, Mr. Stephen S. Wilson is Assistant Secretary of the Ministry's Establishments Division.

Aged about 45, he is tall, with darkish hair, and has a soft voice. He was with the Ministry of Transport for many years before the war. He is said to be a brilliant organiser.—*From "The Sunday Express."*

* * *

Tailpiece

More Seats Needed

Rail passengers demand more seats
To curb their acrobatic feats,
When travelling by day or night
In crowded trains and packed so tight.

With their demands we sympathise
And would not have it otherwise,
But railways have a quandary
Like every other industry.

They want materials and men,
A lot more rolling stock, and then
Their carriages will be replaced
With all their wear and tear effaced.

So, passengers, please patient be
A litttle while and you will see—
New trains and seats for every man
Instead of standing in the van.

W. E. N.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

INDIA

Proposed Delhi-Madras Mail

Speaking in the Legislative Assembly on March 28, Sir Edward Benthall, Transport Member, said that consideration was being given to the possibility of accelerating the present "Grand Trunk Express," and to the introduction of a mail train between Delhi and Madras to run twice a week in each direction.

Strikes for More Rations

A strike of 10,000 workers at the Kanchrapara Workshops, Bengal Assam Railway, which began on March 20, was called off on March 28. The strike was a protest against the cut in rations recently announced by the Bengal Government.

Nearly 1,000 loco. shed and traffic workers staged a "peaceful stay-in strike" at Hubli, Madras & Southern Mahratta Railway, on March 25. Two trains were held up as a result. The workers refused to go on duty unless they were given food immediately. They had not had any rations for two days. The railway authorities promised to take immediate action to issue rations, and normal running was restored next day.

SOUTH AFRICA

Railway Budget Debate

In replying to the debate on the railway budget, the Minister of Transport, Mr. F. C. Sturrock, said that the Cape Town Foreshore Committee had considered the plan drawn up by Mr. Beaudouin, the overseas planning expert, and after eliminating its weaknesses, it had produced a plan which was considered very workable. This would be submitted to Mr. Beaudouin, who would revisit South Africa soon. After this the Government would get to work. The plan covered roads entering and leaving Cape Town in every direction, and those going through the city. It would be possible under the plan to go from one side of Cape Town to the other without touching the centre. Every possible movement of traffic had been considered.

Strengthened Renewals Fund

More had been done to strengthen the renewals fund than by any other Minister, Government, or Parliament in the history of the railways. In 1938 the fund stood at £2,900,000, as compared with £16,500,000 today. This was sufficient to cover expenditure on renewals for the next three years. As a temporary measure it had been decided to reduce contributions to the renewals fund by 50 per cent. The rates equalisation fund had been used this year to tide the administration over a temporary difficulty.

Labourers' Wages

His predecessors, said Mr. Sturrock, had embarked on what had been called a "civilised labour policy," but whereas under the Nationalist Government the labourers were paid 5s. a day, under the old United Party Government they were paid 8s. 6d., and under this Government they were being paid 11s. plus a cost-of-living allowance of 5s. 1d. In the last six years 18,000 railway workers had been promoted to graded positions. He had never imported artisans for the railways, and did not intend to do so. No artisan or other worker was employed by the administration unless he had had three years' residence in the Union. The only exceptions were specialists.

Airways and Airports

Everything the administration was doing in airport construction was in accordance with the latest practice. He had no intention of raising the salary scales of the air staff to those of America. The "York" was a temporary machine and the administration ultimately would obtain another machine for the "Springbok" (overseas) service. It was unfair to compare one aircraft with another, because the efficiency of each depended on the work it had to do.

Road Transport Service

In the running of road motor transport services it was necessary to strike a balance between the interests of producers and those of private transport concerns, and the debate seemed to show that a fair balance was being struck. It was no use asking the road motor transport services to undertake the building of roads without suggesting how this would be financed.

SIERRA LEONE

More Amenities for Passengers

Various improvements in passenger service are being put in hand on the Sierra Leone Government Railway. A dining car is being introduced for the first time in the history of the system, the first section of which was opened in May, 1899. The car has been converted from a former passenger carriage at the Cline Town works, Freetown, of the administration. Another recent job completed at Cline Town is the construction of a first and second class composite carriage, built by African workmen under the supervision of Europeans. Coach building is in the charge of Mr. W. Haresign, formerly of the L.N.E.R. carriage works at Doncaster, and there are numerous other former members of the L.N.E.R. staff among the European officers of the system. The General Manager of the railway, Mr. W. H. Salkield, is a native of Hull.

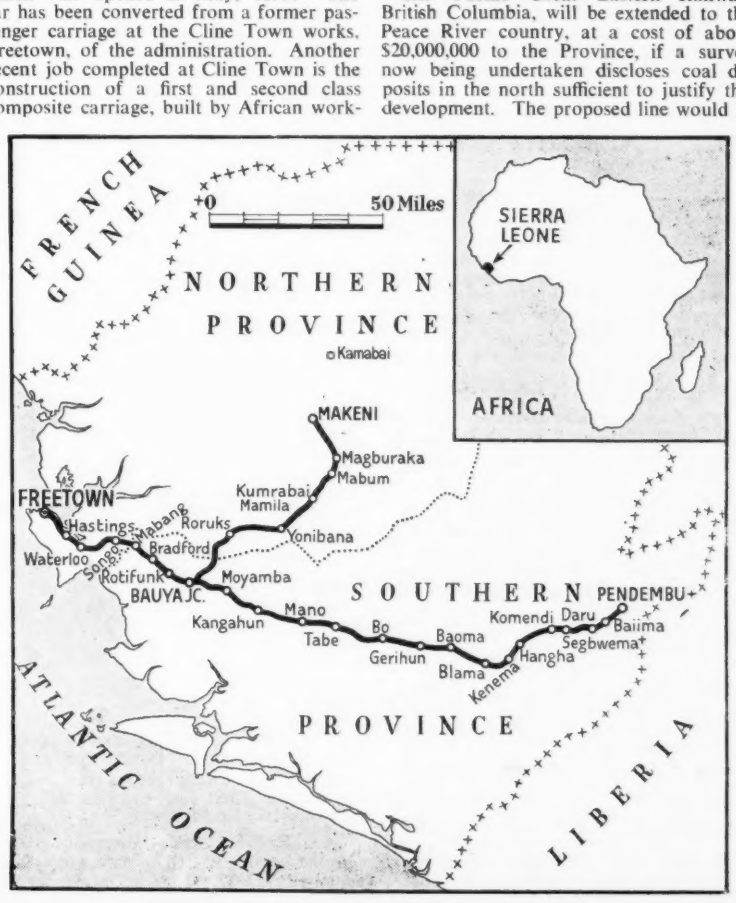
Another innovation on the railway will be the opening of refreshment buffets at Water Street Station, Freetown, and Bauya Junction. Several West African soldiers, now demobilised, have been trained as train attendants and will look to the wants of main and branch line passengers.

Since May, 1945, the shore working side of Freetown Harbour has been under the control of the railway. In 1941, the harbour was taken over by the military authorities, and it was then one of the busiest deep-water anchorages in the world and accommodated many large convoys of Naval and merchant fleets. In 1944 the harbour came under the Port Manager's Department, and under the railway in 1945. The railway has a route-mileage of 310 and the gauge is 2 ft. 6 in. It was completed to Pendembu in 1905. A branch from Bauya Junction to Yonibana was opened in 1912 and extended to Makeni in 1914. Subsequently Kambai was reached, but the section between Makeni and Kambai was converted to a motor road in 1930.

CANADA

Proposed British Columbia Extension

The Pacific Great Eastern Railway, British Columbia, will be extended to the Peace River country, at a cost of about $20,000,000 to the Province, if a survey now being undertaken discloses coal deposits in the north sufficient to justify this development. The proposed line would be



Map of the Sierra Leone Government Railway

built from Quesnel, the present northern terminus, to Hudson Hope, where the main coal deposits are located. If a satisfactory route can be found, the Government is prepared to appropriate another $12,000,000 to extend the railway from Hudson Hope to Dawson Creek, which would render additional Peace River territory accessible to British Columbia. The Provincial Government is hopeful that the co-operation of the Canadian Pacific Railway and Canadian National Railways may be enlisted. It is possible that one or both of the transcontinental systems will assist financially in this project.

The Pacific Great Eastern Railway has been owned and operated by the British Columbia Government ever since the contractors and original private financiers of the system found themselves unable to carry on during the 1914-18 war. The position of the system was thoroughly investigated by a committee representing the Provincial and Federal Governments and the C.P.R. and C.N.R. during the past year. The committee's report has not yet been presented in full, but it is known that it recommended:—

1.—The P.G.E. should continue operations along its present route from Squamish to Quesnel.

2.—Ship and barge transport between Vancouver and Squamish are adequate until such time as the P.G.E. traffic is four times as great as it is now.

3.—A million tons of freight annually would justify P.G.E. extension. A general survey shows that Carbon River and Hudson Hope coal deposits are sufficient to warrant such an expectation of traffic.

Canadian National Results

A decrease of $1,538,000, or nearly 50 per cent., was shown by the Canadian National Railways in net revenue of the entire system for February, in comparison with the corresponding month of last year. The figures were $1,558,000, against $3,096,000. This brought the decrease in net revenue for the two months, January and February, to $3,116,000. February gross revenues were down $2,374,000 at $28,855,000. This decrease was offset in part by a reduction of $836,000 in operating expenses, to $27,297,000. For the two months the gross revenues were down $4,041,000 at $59,756,000, while operating expenses were reduced $925,000 to $55,922,000.

UNITED STATES

Decreased Net Revenue

The Association of American Railroads reports that the net income of Class 1 railroads in February is estimated at $26 million, compared with $378 million last year. In the meantime, increases in railway freight charges to compensate for the wage increases awarded at the beginning of April to 1,220,000 rail employees, cannot be obtained from the Interstate Commerce Commission for at least three months.

Big Bridge Replacement Programme at Cleveland

To be jointly financed by the Federal Government and the railways concerned, a £2,650,000 programme is announced for the replacement of seven railroad bridges in order to improve the inner harbour at Cleveland, Ohio. It is the first major project under the Truman-Hobbs legislation, passed by Congress five years ago, to enable the Government to participate in the financing of railway bridge improvements to aid navigation. In addition, the replacement of the east pier of the Erie Railroad bridge at Mahoning avenue is included in this programme. Work, which is mainly in the form of provision of larger-span structures in replacement of the narrow spans now hindering navigation, is expected to begin shortly.

VICTORIA

Railcars for Branch Lines

One of the first steps towards improving passenger services is the Railway Commissioners' recent decision to acquire a number of modern railcars for use on branch lines. In connection with this decision Mr. R. G. Wishart, Commissioner, and Mr. E. H. Brownbill, Assistant Chief Mechanical Engineer, recently visited Tasmania and inspected a railcar which provides a daily service on the Emu Bay Railway between Burnie and Zeehan—a distance of 88 miles over mountainous country of striking scenic beauty.

This vehicle, which has run over 200,000 miles, has given excellent service. The power unit and the driver's cabin are carried by the front bogie, and are separated by an air space from the main body of the car, which is best described as a semi-trailer supported at one end on the power bogie and at the other on a trailing bogie. This construction almost entirely eliminates engine vibration and noise from the main body of the car.

Mechanical Transmission

The gears are of the electro-magnetic epicyclic type and produce extremely smooth and silent gear changes. The seats are of tubular construction, leather upholstered over sponge rubber, and the close attention which has been paid to the design of seat and back is responsible for very comfortable seating. The capacious luggage racks are of rectangular tube construction.

The first vehicles to be obtained by the Department will be generally of the same design as that operating on the Burnie-Zeehan line. They will have seating accommodation for 40. The power will be supplied by a diesel engine of about 100 h.p., and the cars will have an additional driving compartment at the trailing end.

EIRE

Heavy Rail and Road Traffic

Remarkable figures relating to the passengers and goods carried by the rail and road systems of Coras Iompair Eireann (Irish Transport Company) during the last year and the war period, with comparative figures for previous years, have just been released by the company's Public Relations Department. They show that during the last seven years the services carried 1,378,675,000 passengers with severely restricted fuel and declining rolling stock. On an average, the yearly total of passengers was 197,000,000, or more than fifty times the population, and the daily burden was approximately 540,000 people.

Of this great traffic, the bus services accounted for close on 350,000,000 in the last two years, and the trains carried over two millions. In the same period tram services in Dublin carried nearly 63,000,000. City bus traffic last year totalled 155,143,822, or almost 12,000,000 more than in the preceding year, as against 102,567,000 in 1937. In the last peacetime year, the Dublin buses ran nearly 16½ million miles; last year the mileage was down to 11 millions.

Reduced Train-Mileage

In the provinces, road passengers last year numbered 27,188,196 for a mileage of 8¾ million, or 5 million more than the previous year: in 1939 the total traffic was 26,440,513 passengers for 12 million miles. Train passengers in 1945, at 6,451,942, were up by nearly a million on 1944, but almost the same number less than the total of 1939; but between 1939 and 1945 the mileage fell from 5¾ millions to 1¼ millions. An interesting commentary on bus traffic is that although the mileage fell by nearly 50 per cent. during the years of emergency, the cost of fuel has advanced from £93,594 in 1939 to £307,515 last year.

Between the railways and the road freight section, nearly 30 million tons of goods were carried during the war years. Freight traffic by rail advanced from 2,596,811 tons in 1939 to 3,177,134 last year, and one of the features of this great volume of traffic was the increase in the livestock carried. The number of livestock carried last year by rail was 1,706,605—a larger total than in any previous year during the war, and larger also than 1939 or 1938.

Decline in Fuel Quality

Something like 66 million miles were run by locomotives on the system during the last seven years—more than 9 million a year, and every mile of it a struggle with difficulties created by bad fuel. The coal, which formerly gave a mile of running for 42 lb., has declined in quality to such an extent that a mile now needs a consumption of 82 lb. Last year, C.I.E. spent more than £2 million on the wide variety of stores required to maintain road and rail systems.

FRANCE

French Railway Reorganisation

Reorganisation of the French National Railways Company is now in progress under the control of M. Jules Moch, Minister of Public Works & Transport, who has undertaken to simplify and decentralise its administrative services. His aim is to increase the efficiency and at the same time to make drastic economies in the management of the vast railway network.

Rapid reconstruction of wrecked railway bridges, lines, marshalling yards, signalling cabins and rolling stock involved heavy financial charges, which left the railway budget saddled with a deficit of fr. 34,000 million for the past year and no prospect of easing the financial burden to any great extent in the near future. To deal with the situation the Minister called a special meeting of the S.N.C.F. Board of Administration. After thanking the railway personnel, and especially the General Manager, M. Raoul Goursat, for their success in winning the "Railways Battle" he confirmed the appointment of M. Maurice Lemaire as General Manager in place of M. Goursat.

Decentralised Administration

Now that the lines are unified in a national system, the administrative departments are to be simplified and regional branches formed, under officials who will be encouraged to act more on their own initiative and to assume effective responsibility. The application of these measures will tend to cut out much of the red-tape routine, which arose from grouping the services of five areas in Paris.

The new plan is to have local administrations in eight to ten provincial regions, each with a personnel of 600, making 6,000 at the most. A trial will be made first of all at Marseilles, and then at Lyons, Bordeaux and other centres. Paris may be selected as an administrative centre for the Western Region railways. The present administrative staff numbers 15,000, all in Paris.

Points of Contact between Permanent Way and Signalling

Mr. F. H. D. Page advocates greater collaboration in planning

A JOINT meeting of the Permanent Way Institution and the Institution of Railway Signal Engineers, held at Charing Cross Hotel, London, on April 10, afforded an opportunity for a spirited discussion on some of the problems which confront both the Permanent Way and Signal Departments of the main-line railways. The subject was introduced in a paper by Mr. F. H. D. Page, O.B.E., M.Inst.C.E., Signal & Telegraph Engineer of the Great Western Railway. Mr. C. E. Dunton presided. Basing his remarks on standard G.W.R. practice, Mr. Page emphasised that developments in design and practice during recent years, in both permanent way and signalling, had given rise to a number of new problems, which had proved difficult of solution.

The Signal Engineer had very little say in the design of permanent way fittings, and he had to accept developments and modifications as accomplished facts, and adapt his equipment to suit, whereas some, at least, of the problems arising later might have been simplified had he been consulted beforehand. For instance, he was not consulted to any extent with regard to the design of concrete sleepers, and presumably the requirement of a minimum ballast resistance, under wet conditions, of 2 ohms per 1,000 ft. of track was not taken in account, as experimental lengths of concrete sleepered track on the main-line railways had not given this minimum, and the leakage from rail to rail was aggravated by the development of cracks. The concrete sleeper, therefore, was not, as at present designed, a practicable proposition where track circuits were concerned.

New Problems

The introduction of flat-bottom rail would introduce new problems of point operation and track circuits. Weighted fouling bar, electric treadle, and other fittings would need modification of design. In the United States of America flat-bottom rail was the standard, and presumably no difficulty was experienced in working switches. American switches appeared to be fitted with swivel stretcher rods to facilitate working. Power operation of points was the general practice at interlockings of any size in that country, and the point motors appeared to be designed for operating a heavier load.

Many permanent way men looked on the track circuit as something which complicated their own problems, but it was the most important single factor in the safe and economical operation of traffic, and in the attainment of the maximum operating capacity of the running line. The utmost care should, therefore, be taken to ensure its efficient working. This was particularly important, as modern practice relied upon the track circuit to do much more than in its original applications.

There were certain essential matters in which the Signal Department looked to the Permanent Way Department for particular co-operation where track circuits were involved. Drainage, perhaps, was the most important point, as two fundamental factors governed the efficiency of track circuits:—Ballast resistance (that was, insulation of the current from rail to rail); and resistance of the wheels of vehicles in the shunting path of the track circuit current.

The drier and cleaner the ballast, the less would be the leakage of current from rail to rail, and, therefore, the safer and more economical the working of the track circuit. This was particularly essential in power signalling installations and large track circuited mechanical layouts, where track circuits were used for clearance and route locking purposes, and the margin for such purposes was inevitably small. It was frequently impossible to obtain a margin of more than 5 ft. 4 in., which meant a single pair of wheels. Unfortunately, it was often in such places that good drainage was difficult to maintain.

The practice of dispensing with the lock-bar, and of using the track circuit to control the facing point lock was becoming general, but it presupposed a high degree of track maintenance. A failure of the track circuit might mean serious delay to traffic. Adjustment of the track circuit might enable it to function temporarily, but permanent rectification depended on restoration of the track, if the failure was due to bad drainage or permanent way defect.

With regard to the resistance between the wheels of vehicles and the track, the most frequent cause of failure to shunt the track circuits was due to sand on the rails, and permanent way men would perform most valuable service in removing sand from the rails.

Recent tests had shown that the leakage from rail to rail with through bolted track was twice that where the track was secured with screwed fastenings. This indicated that a higher standard of ballast and drainage should be maintained for the former; but the fact remained that a longer track circuit could be operated satisfactorily with screw fastenings than with through bolts. It was essential with the latter type to ensure that there was no contact between adjacent dog washers. This sometimes happened in complicated fittings, and was difficult to locate.

Hammering at the joints was the chief cause of wear in the insulations. In one installation on the G.W.R., with 650 insulated joints, the longest life of the insulations was six months, and the majority did not last more than three weeks. This was a heavy expense, and a drain on labour resources. Approximately 12,000 sets of insulations had been used on the G.W.R. during 1945, at a cost of £3,400 for material alone.

Opinions differed as to the best type of insulated joint, but whatever the type, firm packing of the joint sleepers was essential. The laminated wood fish plate, with closer spacing of the joint sleepers, was satisfactory, but the sleepers still required firm packing. On sharp curves, this type of joint might not have sufficient lateral stiffness to hold the rail ends in line, and some other type of joint had to be used. This was the case where a check rail adjoined the insulated joint in the stock-rail.

Check chair insulations were a source of trouble, as the fibre became worn by lateral flexing of the check rail. Renewal of the insulation sometimes involved the lifting of the check rails by jacks, and the slackening of several bolts. Where possible, it was better to provide separate chairs for the check rail.

Track circuit failures frequently arose from broken bond wires. Breakage might also occur where the bond wire was run through the chairs, and became pinched by the rail when there was slack in the road. The usual practice was to duplicate the wires, which cost more and did not solve the problem completely.

A type of bonding much used in the United States of America was less likely to be damaged by permanent way operations, and practically eliminated the length of track unprovided with broken rail detection by reducing the dead gap at each joint from 4 ft. to 6 in. The importance of this would be appreciated from the fact that nearly 50 per cent. of rail breakages at the joints on the G.W.R. during the last five years had been within 2 ft. of the rail end. Insulation and bonding ensured the integrity of the track throughout the circuited section, and the detection of a broken rail throughout the path of the vehicles, but they required many cuts in the rails. In some complicated layouts, single rail track circuits had to be adopted, and great care had to be taken to avoid breaking these bonds as the consequence might be serious.

Maintaining Detection

The Signal Department had to ensure that the detection of switches was maintained, so that the signal could not be lowered if the running switch tongue was open more than $\frac{1}{4}$ in. The problem of installing and maintaining detection with so small a tolerance under the heavy stresses borne by the track was one of considerable difficulty. It was not generally appreciated that the vast majority of signal failures due to detection arose not from a failure of the signal or detection, but from a failure of the permanent way.

The importance of maintaining the correct gauge at the switches could not be over-estimated. The track might measure true to gauge when clear of traffic, but it might spread sufficiently under load to give an opening of over $\frac{1}{4}$ in. at the tongue, and so defeat the security given by the detection, and possibly lead to a derailment. Side cutting of the stock rail due to a preponderance of traffic running in one direction would defeat the object of the detection, and, therefore, required careful observation.

The earlier type of flexible stretcher bar with double bolt angle bracket had been the source of considerable trouble. Unless the angle of the bracket was correct, and properly shaped packing pieces were inserted, an opening between the top of the toe of the switch and the stock rail would result when the bolts were tightened. This would not be provided for in the detection, and frequently the brackets had had to be altered before the points could be brought into use after an occupation.

Every effort should be made to ensure the easy and efficient working of switches after they had been connected with the signal box. Preliminary assembly of the fittings on the ground was of great assistance, but it should be followed by great care in laying, as a comparatively small amount of distortion could cause the Signal Department serious trouble. No attempt to couple up should be made unless the tongues could be barred up in either position freely, and without undue spring to one side or the other.

One of the chief causes for heavy working arose with the curved switch tongue of the rigid heel type, which, canted at 1 in 20, assumed a vertical curve, and bore only on the heel and front slide chair. The whole weight of the switch was carried on these two chairs, and the oil was quickly pushed off the front slide chair, whilst that on the intermediate

chairs was serving no useful purpose, and vibration was increased. The effect was particularly acute with motor-operated switches.

In conclusion, it should be mentioned that when switches gave trouble, the signalman immediately informed the signal lineman. Only an analysis of failures could give a true perspective of the signal lineman's responsibility. On the Great Western Railway, for instance, 6 per cent. of the total number of calls last year for the signal lineman should have been for the permanent way ganger.

The Discussion

The Chairman referred to the pleasure it afforded them to have members of the Institution of Railway Signal Engineers with them. He wished to ask a question himself at the outset. Why was it that when they wanted to detect the action of points that moved at right angles to the track, they put in apparatus which was sensitive to any longitudinal movement and brought about a signal failure when that took place? Why not take care of the transverse movement while remaining unaffected by the longitudinal?

Mr. N. W. Swinnerton emphasised that a signal engineer had been appointed to advise the designs committee from 1920 to 1929; it was incorrect to represent the signal people as not being consulted. The L.M.S.R. Signal Engineer was called into the picture when concrete sleepers were being arranged for and requested to make tests from the point of view of track circuiting. Leakage arose from moisture on the sleepers and cracks assisted it. Track circuits were not workable with concrete sleepers. Everybody concerned had been brought into the thing, including the manufacturers. In the matter of flat-bottom track the speaker hoped to see the vertical design of switch adopted. Drainage of the track was very important, but he did not think the signal engineer would like being charged with the cost of improving it, although the civil engineer would welcome support in that direction.

When they had to decide whether to use through bolted track or not, the signal engineers told them the track batteries would have to be doubled, so the proposal was dropped for that and other reasons. Speaking of the wooden type of insulated joint the speaker referred to the use of metal mesh reinforcement to strengthen the design; this was held to be quite good. With flat-bottom rail they had been able to improve the track stiffness at the joints and get better conditions for them. They had experimented with welded bonds, but costs were against them. It might be better to use them and eliminate the troubles now met with. With regard to rail breakages with flat-bottom track, modern methods of treatment had considerably reduced their number. The cutting of the track to put insulated joints in was sacrilege to the civil engineer.

Mr. H. H. Dyer, President of the Institution of Railway Signal Engineers, expressed thanks for the invitation his members had received. On the L.M.S.R. they saw each other's problems and helped each other at all times. They had not, however, been consulted on concrete sleepers until it was too late, and they were already laid. They might have been able to advise on the design from the electrical point of view. They could not use track circuiting with these sleepers, and steel ones were just hopeless. With the latter they had to have recourse to wheel-counters and other devices they preferred to be without. What they wanted was a well-ballasted, well-drained, and wood-sleepered track. He could say definitely that with flat-bottom rail the points would require more effort to work them, and at some locations they might have to use power and put in a more powerful machine than they usually used. The American design, intended for flat-bottom track, was rather expensive.

Their lighter British machines could operate the two ends of a crossover in bull-head track, of which one was bolted and even at times when both were. Good drainage was rightly regarded as the first requisite in track circuiting. Years ago some interesting tests were made on the G.W.R., which the speaker had to confer about for his own company, to compare sections of track fastened with coach screws and through bolts, and they showed that with the latter good drainage was very important indeed. As regards wheel-to-rail contact, sand was a matter for the locomotive people, but at difficult locations they had found that a copper strip insert, welded to the rail head, was the solution, although the difficulties of satisfactory welding needed to be overcome. If a joint of insulating material could be obtained which would meet every requirement of the civil engineer, then the insulated joint problem was solved. Signal engineers were trying to get rid of the f.p. lock bars in the track and in return they should get good conditions for the substitute.

Speaking of short bonds, he had seen instances where the rail had been broken and the fact was not detected on account of the damaged parts remaining in good contact. Point detection ordinarily was provided to prove the movement of the tongues and their closure with the stock rail. To cover everything, including wide-to-gauge conditions, would call for another slide in the apparatus. If they could pack sleepers perfectly, which in some places was scarcely possible, they would get rid of the majority of their troubles.

Mr. M. G. R. Smith doubted whether any good would have come of consulting the signal engineers on the design of concrete sleepers. All too often they heard the complaint "points failed to close." There must be some cause for that. Was it in the permanent way or signalling equipment? Difficulty arose after the detection was fitted with the spreading of the road and it was questionable whether the clearances in the holes in switch chairs and soleplates did not need looking into.

Spreading of the Road

Mr. P. Williams thought that spreading of the road was their chief source of trouble. They used packing between the chair and stock rail when side wear appeared. There seemed to be room for some strengthening of the components. Clearance in soleplate drilling was at times excessive and detection had to be altered because the road had spread. He felt they could arrive at better methods of packing between stock rail and chair.

Mr. L. G. B. Rock felt that the discussion might have been named "points of impact" between the engineers concerned. They did not like the concrete sleepers, but war conditions forced them to have them. There were plenty of places where track circuits were not wanted and they could use them there. Mechanical considerations had governed the form of reinforcement. When renewals were being planned they always sent full details to the Signal Engineer, who thus had a chance of objecting. The electrical engineer was consulted when necessary. In America, where the flat-bottom switches had heel joints, a signalman told him he was always calling in the section foreman to ease the working, but with the sprung flat-bottom type on the L.N.E.R. the speaker could not detect any difference from bull-head equipment. On the Southern Railway they had gone over to the laminated wood insulated joint. Of late the quality had been improved. They did not care, however, for the two-hole pattern.

The reinforced plate was a sound job, but they were not satisfied that the mesh necessarily would be so accurately placed that no strands could get displaced and make contact with the rail. The stretcher bar problem was largely a question of faulty design or faulty manufacture. He thought the G.W.R. riveted design likely to be more troublesome than the standard with bolted bracket. They left one off and drilled the bar in position, giving perfect fit even with a slight irregularity in the gauge. Drilling also got over any little error in the bracket. In welding soleplate stops they compromised and had two positions for six types of switch.

Improvisation

Mr. P. R. Allen thought it impossible to keep switches permanently firm and tight; they had to rely on improvisation to get things right again. The gangers did not know about all the devices that existed and should have access to the stores items required to effect cures.

Mr. H. Chanter said the permanent way man looked on track circuits as an inconvenience at best. On an electric line they affected their work in no small degree. They would welcome help in connection with shorting joints and accidental contacts with the positive traction rail. Could they not keep the signalling track rail always on the side remote from it? That would be a great help. The copper strip device should be useful where little used rails got rusty and caused failures, but they had not found it completely satisfactory. The copper got frayed and did not protrude sufficiently from the rail, with a risk of non-operation by hollow wheel-treads. On L.P.T.B. lines the permanent way man was responsible for block joint maintenance. They wanted a really substantial joint. They had had trouble with laminated ones splitting. Fibre insulations had a very short life in some places. The arrangement for check rails, which the opener had described to them, with a division in the base of the chair, seemed to him rather revolutionary.

Mr. A. W. M. Dyke found he could get on very well with the permanent way engineers; the signal staff were bound to do all they could to help them. They were limited in their ability to make alterations, as their primary duty was to secure a strong permanent way. Consequently they could not look favourably on the insulated joint. The through bolt chair was a disadvantage perhaps from the track circuit point of view, but it had advantages of its own, such as affording them an excellent earth for their A.T.C. working. It was their practice to paint their insulated joints before fitting. It filled the voids and kept the wet out. It was a great advantage to the signal engineer to have a sight of renewal plans beforehand. Speaking of modern developments, Mr. Dyke suggested that soon they might be able to fit something to a train that automatically would stop another one from running into it.

Mr. F. Lloyd considered drainage to be a great problem. Paddington, for example, was a difficult location. He did not know

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Radio-Frequency Crack Detector

An instrument affording high speed of operation by unskilled staff after brief and elementary instruction

BRIEF reference was made in our January 18 issue to a radio-frequency crack detector, one of many instruments in a new range developed and produced at the Salford instrument works of the General Electric Co. Ltd. The crack detector was developed in conjunction with the Ford Motor Co. Ltd. It is designed for the precise and rapid indication of the presence and depth of cracks and seams in ferrous and non-ferrous electrically-conducting materials. Its principal features are: (1) The giving of a direct reading—no interpretation is necessary; (2) high speed of testing, as the operation is performed in one movement; (3) high speed of operation; (4) adjustment and operation is possible by unskilled staff after brief and elementary instruction; (5) a breakdown indicator, which gives immediate warning if the automatic apparatus fails.

The operation of the instrument depends on the facts that radio-frequency currents travel on the surfaces of materials and that any crack in the surface will interfere with the flow of current. The material being tested is passed through a coil which forms part of a tuned circuit, and the alteration of the frequency of the circuit due to the presence of cracks operates frequency selective relays; these cause a lamp to light showing that a crack is present, and its depth is indicated on the dial of the instrument.

The crack detector illustrated comprises a radio-frequency generator, and a separate oscillator unit, provided with leads of any convenient length to the ends of which interchangeable coils may be connected to deal with materials of different sizes (the illustration shows the general appearance of the apparatus, although the measuring coil unit normally would be maintained some distance from the radio-frequency generator and oscillator unit).

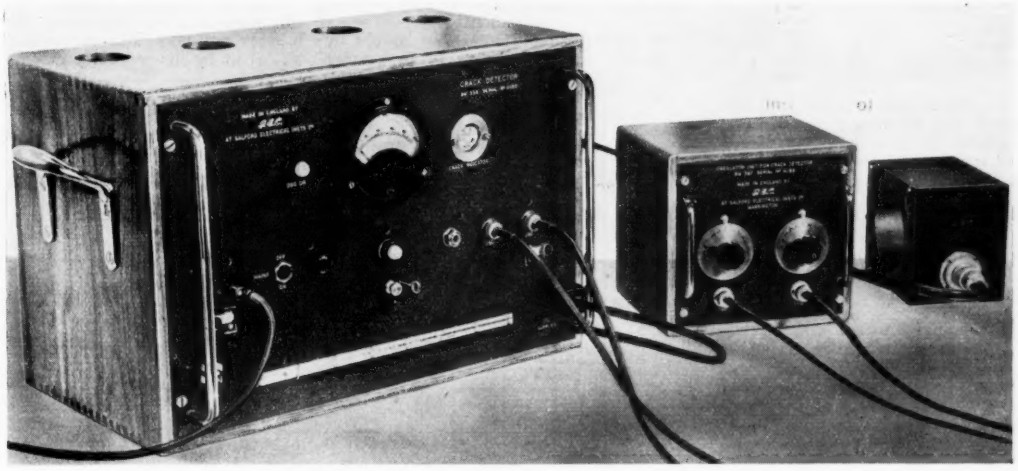
Four standard measuring head units can be supplied, having inside diameters of 4 in., 2½ in., 1¼ in., and ⅞ in. respectively. The instrument is capable of giving indications of cracks from less than 0.001 in. up to 0.250 in. deep (the upper limit of accuracy is set by the condition of the surface of the material to be tested).

The crack detector was developed primarily for testing wire and bar stock materials and, with suitable adaptations, can cover a range of such materials from 40 S.W.G. to 36 in. diameter. Round, hexagonal, tubes, angles and channels, and variations of these shapes of material within the above limits, also can be tested with suitably-shaped measuring head coils, which can be supplied specially to order.

The standard instrument is designed for operations from a.c. 230 volts 50-cycle single-phase supply, and its consumption is approximately 80 watts.

The material to be tested should be in the form of bar stock, wire or strip, and may be fed through the detecting coils in continuous lengths at any speed up to one foot per second. The initial zero is set by varying the dials of the two oscillators, which then should be locked to ensure no deviation in the setting. A further check may be obtained by employing headphones. The sample to be used then should be inserted in the appropriate head unit, and the meter on the panel will read depth of crack in thousandths of an inch.

The crack indicator (the red lamp) may be adjusted so that the red light just lights when a crack of the permissible depth enters the head unit. For instance, it may be desired to reject material with cracks of more than ten thousandths of an inch, but to pass material with shallower cracks: if a piece of material is put in with a crack as deep as, or deeper than, ten thousandths of an inch (measured on the meter), and the sample moved until the meter reads ten thousandths, then, by the turning of the "set crack depth" dial, the red lamp can be caused to operate just at this point, and will stay lit for cracks ten thousandths of an inch deep and deeper. By this means, it is possible to provide a continuous indication of depth of crack on the meter, and to provide an automatic means of rejection when cracks of more than a specified depth are reached.



General view of radio-frequency crack detector

Points of Contact between Permanent Way and Signalling

(*Concluded from page* 456)

how the track circuits worked as they did. Sanding was a trouble too. The sand stayed on the rails and engines and vehicles got "lost." This was a matter for the locomotive people and he suggested that Mr. Page should call all concerned together to consider the proposal that the sand put down should be wiped off. The C.M.E. ought to do that, and in his own interest, as the sand was wanted for the driving wheels. Once they were over it, it was a disadvantage and increased the load to be moved. Some apparatus to clear the sand away again was certainly wanted. The laminated insulated joint was very good, and as to broken bonds, the permanent way men only broke those that had become so rusty and brittle as to fall apart when touched. Cutting the rails to accommodate insulated joints was a great nuisance and ought not to occur. The speaker referred also to difficulties experienced with the adjustment of detectors and the bowing produced on switches after fitting them up. No two G.W.R. departments got on better together than did the signal and permanent way staffs.

Mr. F. Horler, speaking of flat-bottom track, referred to the pressure required to close a switch against the stock rail as being probably double that needed with bull-head rails, and asked whether permanent way engineers had any objection to devices designed to assist the points in moving, such as roller bearings? Wear in joints and pins, however the points might be operated, was principally caused by the vibration set up by traffic. Good packing was vital from that point of view.

The Chairman, summing up the discussion, said nobody had answered his opening question. It had been a most interesting debate and he moved a hearty vote of thanks to Mr. Page for initiating it. This was carried with acclamation. It was announced that there would be a visit to Southampton in May.

Service Tests of Electric Locomotives—3

Some results obtained with the Amsler dynamometer car operating on the Italian State Railways

SOME results obtained with the Amsler dynamometer car after it was handed over to the Italian State Railways for acceptance may now be given. The trial run, which took place on October 27, 1936, was made with a regular express between Pianoro and Florence, on the direct Bologna-Florence line which passes through the second Trans-Apennine tunnel. The locomotive used was one of the new large 3,000-volt d.c. machines of the "E.428" class, having two independent trucks, each comprising two driving axles and a bogie, arranged to form the 2B + B2 wheel layout. Each driving axle has twin motors in one common casing, and direct spur-gear transmission.

The leading characteristics of this class of engine are:—

Weight in working order	130 *tonnes*
Length overall	62 ft. 3½ in.
Driving wheels, dia.	6 ft. 2 in.
Bogie wheels, dia.	3 ft. 7¼ in.
kW. at motor shafts, continuous rating	2,520
,, ,, ,, hourly rating ...	2,800

The train was made up as follows: Dynamometer car, 48 *tonnes;* 1st and 2nd class composite, 36 *tonnes;* two 2nd class coaches, 72 *tonnes* total; 1st and 2nd class composite sleeper, 38 *tonnes;* dining car, 47 *tonnes;* and postal van, 19 *tonnes.* The total weight of the train, unloaded, was therefore 260 *tonnes* for the 7 vehicles. Regenerative braking was not used on the run, but hand brakes could be applied to the whole train, locomotive and coaches alike.

The original diagrams of the electric recording apparatus are shown opposite, namely, voltage at overhead line; and current and power (kW.) measured between the main motors and the earth return; also the mechanical diagrams.

From the values measured at the drawbar, as given by the dynamometer car, those referring to the driving wheel treads have been derived. The latter values are greater than the drawbar values, firstly by the dynamic effort required to overcome the inertia of the locomotive itself, and secondly by its resistance to movement. The force required to overcome the inertia of the locomotive is obtained by multiplying the indication of the Doyen inertia pendulum, recorded on the dynamometer diagram in kg. per *tonne* of rolling weight, by the weight in working order of the locomotive. In reality, however, matters are somewhat less simple. The force inherent in the purely dynamic displacement of a vehicle—in the present case the locomotive—consists of the algebraic sum of the force necessary for accelerating or retarding it, and of the force for raising or lowering it on gradients (in other words of the component of gravity along the gradient). The accelerated mass itself consists of the purely translatory mass of the vehicle M, increased by the mass of all the rotating members (wheels, axles, gears and rotors of the main motors) reduced to the periphery of the driving wheels:—

$$m_r = \sum \frac{k^2}{r_i^2} \cdot \frac{J_p}{r^2}$$

where J_p = polar moment of inertia; r_i, r_k = radii of gears; r = radius of driving wheels, that is, summarised, M + m_r. For an electric locomotive the virtual mass m_r of the rotary members is far from being negligible.

For running on the level the calculations are simple. It suffices to increase the translatory mass by a certain percentage to account for the rotary masses, and to multiply the corrected mass by the inertiometer reading. On a gradient, however, one must calculate separately the product of the total apparent mass M + m_r and the linear acceleration (deduced from the speed diagram) and add to it the product of the locomotive weight and the gradient.

In ordinary practice, this very laborious method will seldom be adopted, the engineer contenting himself with multiplying the indication $\frac{dv}{dt} + g \sin \alpha$

(where v = speed, g = gravity, α = gradient)

of the Doyen pendulum, either simply by the purely translatory mass, or by a more or less amended fictitious mass. For the present calculations, owing to the fact that a mountain line of very changing profile is concerned, where sometimes one and sometimes the other of the two preceding possibilities comes into play and the influence of gravity is often preponderant, an approximate calculation *without* any correction for the rotating masses has been used. This is the more justified, since the aim primarily is to give a clear idea of the interpretation of the diagrams obtained.

The resistance to movement of the locomotive is shown diagrammatically. This resistance, expressed in terms of the weight in working order of the locomotive by the formula—

R in kg./*tonnes* = 2·6280 + 0·000395 v^2

where v = speed in km.p.h., includes all the non-active resistance of the locomotive; rolling resistance of the tyres on rails; friction of the axle journals and of all shafts of the mechanism; meshing resistance of gears; friction of the commutator and bearings of main motors; ventilation losses of motors; and finally the aerodynamic resistance of the locomotive body. The values from the formula, multiplied by the weight in *tonnes* of the locomotive, define the physical resistance to movement of the latter. This resistance is the resistance to movement on a straight track. On a curve it has to be increased by the curve-resistance, which is inversely proportional to the radius.

The total tractive effort developed by the locomotive at the wheel treads has thus been established by adding the three constituents, namely, pull at the drawbar (dynamometer car) + force of inertia + resistance to movement of the locomotive. The effective power of the locomotive at the wheel treads has then been obtained from the tractive effort at that point and the speed (H.P. = 3.7 × tractive effort (t) × speed (km./h.) or H.P. (at treads) = H.P. at drawbar × $\frac{\text{tractive effort (treads)}}{\text{tractive effort (drawbar)}}$.

Finally, the *instantaneous* overall efficiency of the locomotive is given by:—

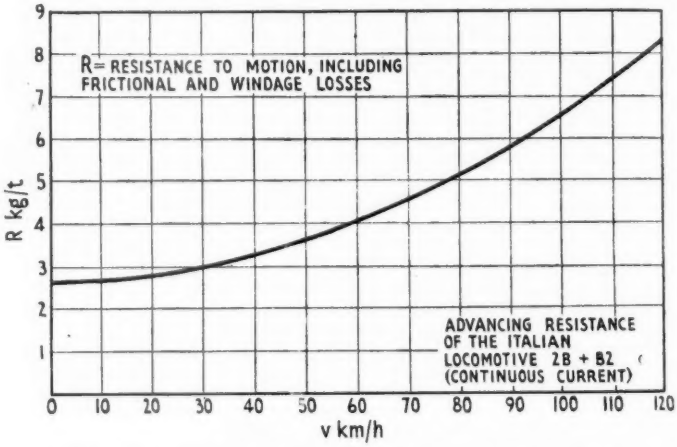
$$\frac{\text{Power in kW. at the wheel treads}}{\text{Power in kW. at the return circuit}}$$

The *instantaneous* efficiency obtained in this manner is not absolutely correct, for it does not take into account the power absorbed by the auxiliary machinery, also supplied from the overhead line. But in direct-current locomotives, where measurement of the power used is made exclusively on the return side of the main motors, it is hardly possible to take simultaneously into consideration the instantaneous power of the auxiliary machines, since for simplicity the latter are only fitted with one kWh.-meter. The energy supplied to the auxiliary machinery will, however, be included in the *average* efficiency:

$$\text{or} \quad \frac{\text{work done at wheel treads}}{\text{energy received at current collector}}$$

over a given length of run, as will be seen later.

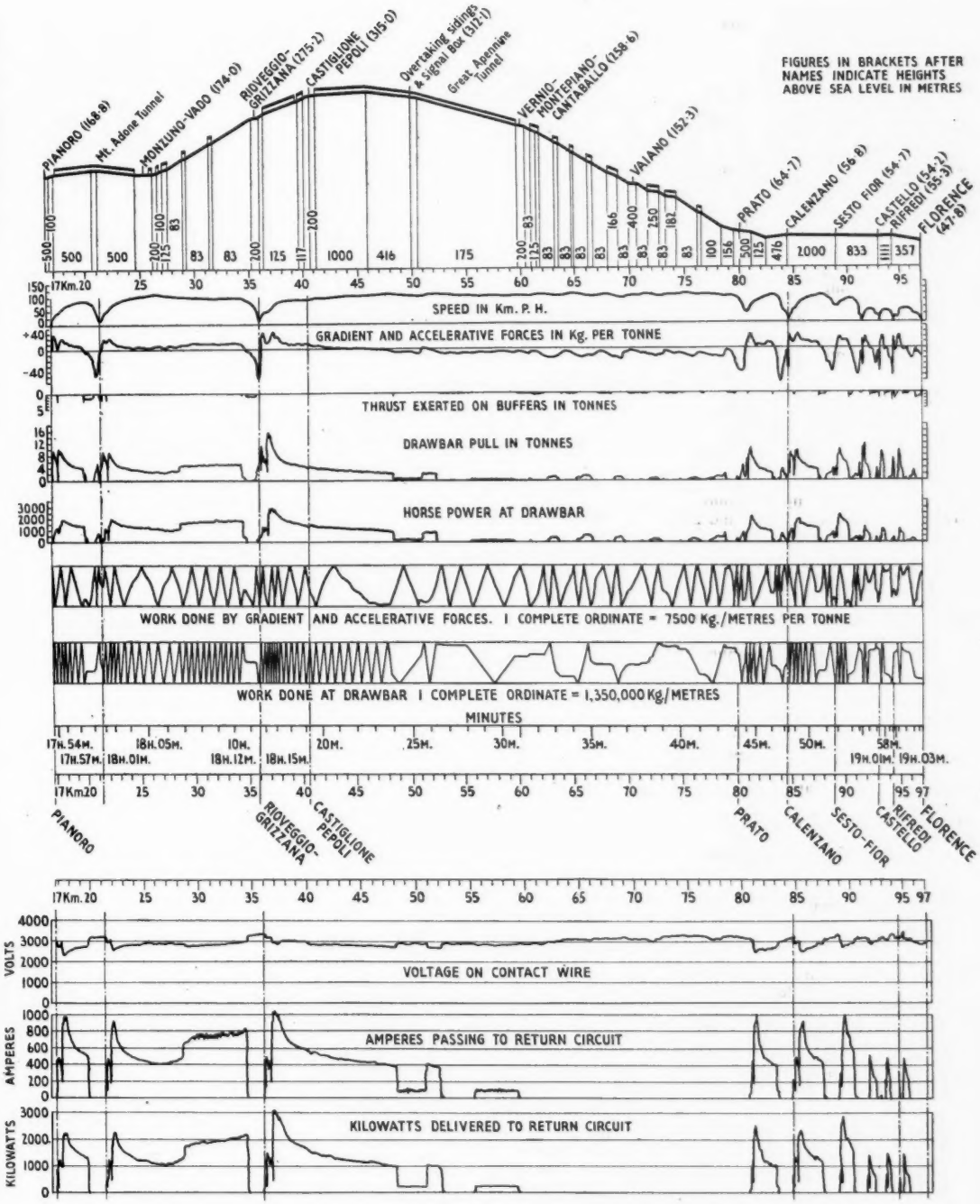
(To be continued)



Resistance to motion of the Italian locomotive used on the dynamometer car run reproduced on the opposite page

Part 1 appeared in our March 1 issue and Part 2 in our March 29 issue

SWISS RAILWAY PRIMERS.—The first of a projected series of "Swiss Federal Railways Primers," entitled "Our Locomotives," has been published by the Orell Füssli Verlag, Zurich. All types of Swiss locomotive and motor vehicle are described, and the method of classification explained. Although not intended to be technical in the ordinary sense, the descriptions are so written as to be serviceable to engineers desirous of understanding the principal features of the various locomotives and motor coaches.



Dynamometer car diagrams taken in Italian State Railways car on test run with a 260-tonne train between Pianoro and Florence (see article opposite)

SIXTY YEARS OF ELECTRIC TRACTION.—A recent issue of the *Bulletin Sécheron*, with the title of "Sixty Years of Electric Traction," presents a record of the work done since 1884 by the firm now known as the Société Anonyme des Ateliérs de Sécheron and its constituents. In 1890 the first electric tramway in France was installed at Clermont-Ferrand and in 1892 the company built the first electric rack railway in the world, at Mont Salève. It was a pioneer in the use of high voltage d.c. for traction, and in 1903 equipped the St. Georges de Commiers-La Mure line in France at 2,400 volts on the 3-wire system. When the general electrification of the Swiss main lines was definitely decided on in 1918, the Sécheron Company took steps to be in a position to supply single-phase traction equipment. Equipment of every type has been supplied, in association with other leading Swiss concerns, both to the Federal and the privately owned lines. Trolleybuses and other forms of traction have also formed part of the firm's activities, which have been extended to several countries.

Rhine Railway Bridges in the British Zone

A summary recording the various bridges and some notes on the reconstruction of the Baerl bridge as a permanent structure

IN what is now the British Zone in Germany, there were before the war six railway bridges over the Rhine, collectively carrying 16 standard-gauge tracks, namely:

Rhine Bridge at	No. of tracks
Wesel	2
Duisburg, Baerl	2
,, Hochfeld	2
Dusseldorf 2 double-line sets of spans	4
Cologne, Hohenzollern ,, ,,	4
,, South	2

As all these bridges were demolished during the campaign, the Allies built three temporary single-line bridges to maintain the principal lines of communication of their advancing armies in replacement of these demolished permanent bridges.

Site of temporary bridge	Built by
Spyck (near Emmerich) Victory Bridge	British troops
Wesel (on a new alignment) ...	American troops
Duisburg, Hochfeld	American troops

They have already been described in *The Railway Gazette* of June 8, 1945.

These temporary bridges were a serious hindrance to the river traffic, and it was on this account that the 105-ft. span in the Spyck bridge was quickly converted to a lift span. For the same reason, it was decided to remove at least the centre part of the Wesel bridge as soon as urgent traffic relaxed sufficiently to allow this to be done. For several months, therefore, the Spyck and Hochfeld single-line bridges have been working to utmost capacity.

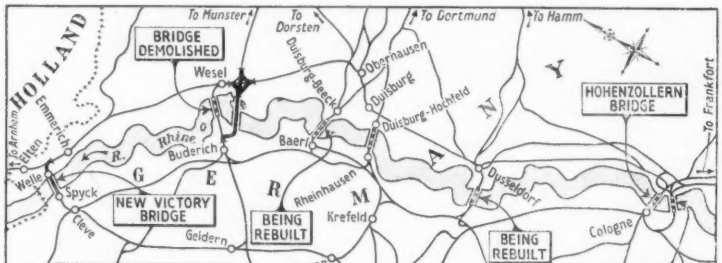
Some relief was afforded by the completion of the Deventer bridge in Holland and diversion of certain traffic over it, as mentioned in *The Railway Gazette* of January 25, 1946. It was, however, decided as long ago as July, 1945, to put in hand immediately a permanent railway bridge over the Rhine in the British Zone in Germany, with the object of completing it before danger from ice floes threatened.

Of the six permanent though demolished bridges, that at Baerl was selected as being the most easily repaired, and because its restoration would enable the neighbouring Hochfeld and also the Spyck bridge to be removed, and would greatly increase trans-Rhine rail traffic. Its completion would eliminate all temporary bridges in the zone which obstructed river traffic.

As the accompanying sketch map shows, the Baerl bridge is on the Duisburg-Beeck to Baerl section of railway. It consists of 15 lattice girder spans, namely, three twin single-track deck spans in the western approach, each 41 m. (134 ft.) long; three main river through-type spans—a central 186-m. (610-ft.) span flanked on each side by a span 106 m. (348 ft.) in length—all double track; and nine twin single-track deck 41-m. spans forming the eastern approach. The overall length of the bridge is 912 m. (2,991 ft., about half a mile).

This bridge was damaged at various times during the campaign by bombing, shelling, fire, and, finally, demolition. The 106-m. eastern river through span was cut in the centre, so that the two halves came to rest with their outer ends still on the masonry piers, but the central bays were on the river bed. In addition, seven of the twin single-track spans in the eastern approach were cut and dropped at one end, and three piers in this approach were also blown.

Restoration work began on August 27, 1945, under the direction of the Railways Branch Control Staff, both Rhine Army and Control Commission, Germany (British Element). Ready assistance was given by all branches of 1st Corps and the local Military Government. Lt.-Colonel L. E. Hawkins, M.B.E., R.E., Commanding the 6th Railway Construction Engineers, was in charge of the work, with the following units under him: 926 Railway Bridging Company, R.E.; 162 Railway Construction Company, R.E.; 956 Railway Survey Company, R.E.; 42 and 55 Mechanical Equipment (Transportation) Platoons, R.E.; and 174 Pioneer Company.



Map showing the position of bridges over the Rhine in the British zone

Five German contractors, though employed by the Reichsbahn, also came under the supervision of the British troops. The R.Es. were engaged mainly in lifting and temporarily supporting the damaged approach spans, while the German labour was responsible for lifting and repairing the 106-m. river span, and also for the permanent repairs to the steelwork of the approach spans lifted by the R.E.s. As will be seen from the accompanying illustrations, each half of the 106-m. span was lifted by a separate gantry crane with splayed legs, each leg being carried by 16 piles stiffened by four raker struts. The work was officially opened by Brigadier Sir Robert E. Marriott, Director-General of Railways, British Zone, on February 26.

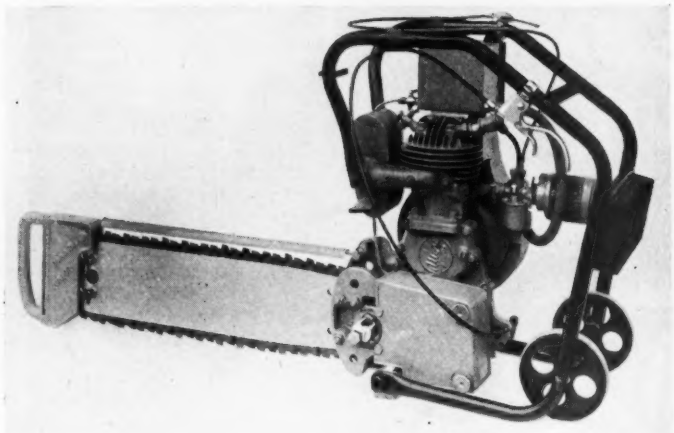
After orders had been issued for the repair of the Baerl bridge, it was decided to rebuild Cologne South bridge, in the first instance as a single-line structure to be completed this spring; it is to be rebuilt as a double-line bridge later. Furthermore, it has been decided to rebuild the Dusseldorf bridge to carry a single line only for the time being, and this work should be completed by about midsummer.

Rhine Railway Bridges in the British Zone

The above illustration and the view on the previous page show two stages in the reconstruction of the Duisburg-Baerl bridge

Power-Driven Hand Tools for the Civil Engineer's Department—2

Petrol and electric portable saws



Danarm Junior one-man portable petrol saw

PORTABLE power-operated saws save labour and time not only in the operation of cutting, but also by eliminating the necessity of manhandling the wood to the saw bench. The three types of saw illustrated are supplied by J. Clubley Armstrong, Abford House, Wilton Road, London, S.W.1. They have a useful railway application in their ability to saw through stacks of planks for making sleepers or to produce timber in the sizes required for general building operations, and are also suitable for tree felling.

The Danarm Junior saw, weighing only 55 lb., can be operated by one man, and will cut trees up to 22 in. dia., or up to 40 in. in emergency by means of a simple adjustment and the use of the saw from both sides of the work. The saw can be wheeled to the site of the work, but when in use is supported by the operator by means of the substantial tubular frame. A cushioned pad is provided to take the weight of the engine. Provision is made for rotating the float chamber of the carburettor through 90 deg., so that the saw can be used in a horizontal position when necessary.

The engine is a Villiers two-stroke of 1·5 h.p., with flywheel magneto and petrol lubrication. A built-in fan provides adequate cooling even for tropical conditions. The drive to the chain is transmitted through a two-plate cork-insert type clutch, with a shock-absorbing slipping arrangement to safeguard the engine against overload. Automatic lubrication of the chain is provided.

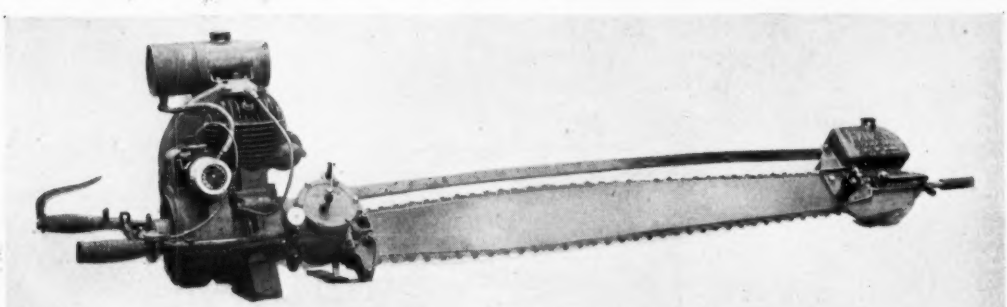
A larger type of Danarm portable petrol-driven chain saw, for operation by two men, is shown in the second illustration. The weight is approximately 130 lb.

Various sizes of saw guide plate and chain can be fitted to provide for cutting widths from 3 ft. 3 in. up to 7 ft. The guide plate can be adjusted to five positions, at 45-deg. intervals, including vertical and horizontal. Lubrication of the chain is automatic in all positions except when turned fully to the left. In the illustration the plate is shown adjusted at an angle. The chain is maintained in tension automatically.

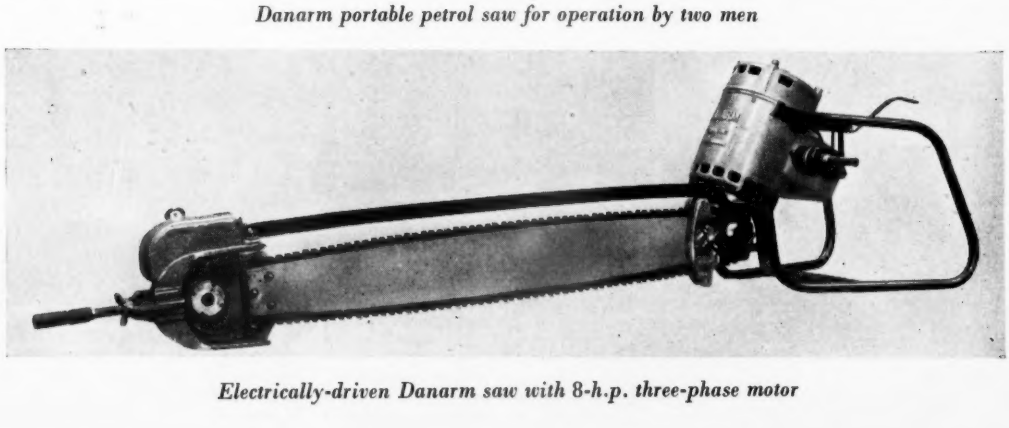
The petrol engine and transmission are similar to the one-man saw already described, but since the saw is always used with the engine vertical, different angles of cut being obtained by adjustment of the guide plate, the carburettor float chamber is fixed in the ordinary way.

The third illustration shows a Danarm two-man portable chain saw with electric motor drive, the type shown having an 8-h.p. 440-V. three-phase 50-cycle a.c. motor. A 220-V. direct current type is also available, or a 110-V. d.c. motor can be fitted if specified.

The cutting widths of the saws are from 3 ft. 3 in. to 7 ft. As in the case of petrol saws, a slipping clutch provides automatic protection against overload in case of the saw jamming, the motor continuing to run. A built-in fan cools the motor and ensures efficient operation with low current consumption. Control of the three-phase a.c. saw is by means of a handlebar lever which operates a star-delta switch through "start," "run," and "off" positions in sequence.



Danarm portable petrol saw for operation by two men



Electrically-driven Danarm saw with 8-h.p. three-phase motor

RAILWAY NEWS SECTION

PERSONAL

L.M.S.R. Advertising & Publicity Officer

The L.M.S.R. announces that Mr. J. O'Neill has been appointed Advertising & Publicity Officer, in place of the late Mr. Loftus Allen. Mr. O'Neill will also continue to be responsible for the Executive Research Office.

Lord Halifax and Marshal of the Royal Air Force Lord Tedder have been elected Honorary Members of the Institution of Civil Engineers.

Mr. I. C. Forsyth, M.I.Loco.E., Assistant, Office of Superintendent of Motive Power, Chief Operating Manager's Department, Watford H.Q., L.M.S.R., who, as recorded in our March 8 issue, has been appointed Assistant Works Superintendent, Locomotive Works, Crewe, received his training at Derby Technical College as a privilege apprentice (he was awarded Sir Henry Fowler's Prize & Scholarship in 1916)) and at Derby Locomotive Works, Midland Railway, between 1916 and 1921; from 1918-19 he served with the Armed Forces. In 1922 he went to the Motive Power Depot, Nottingham, after which he was appointed Running Shed Foreman at Lincoln. In 1925 he was made Assistant to District Locomotive Superintendent, Saltley, transferred in a similar capacity to Preston in 1928, and in 1934 was appointed Assistant District Locomotive Superintendent, Blackpool. Between 1935 and 1940 Mr. Forsyth was first General Assistant and then Utilisation Assistant (Motive Power) to the Divisional Superintendent of Operation, Manchester; in the latter year he joined the staff of the Divisional Superintendent of Operation, Crewe, as Maintenance Assistant (Motive Power). He was appointed District Locomotive Superintendent, Plaistow, in 1943, and Assistant, Office of Superintendent of Motive Power, Watford H.Q., in November, 1945. Mr. Forsyth is a former Chairman of the Manchester Centre of the Institution of Locomotive Engineers.

Mr. I. C. Forsyth

Appointed Assistant Works Superintendent, Locomotive Works, Crewe, L.M.S.R.

Mr. M. G. Burrows, A.M.I.Mech.E., A.M.I.Loco.E., Assistant Works Superintendent, Locomotive Works, Horwich, L.M.S.R., who, as recorded in our March 8 issue, has been appointed Assistant Works Superintendent, Locomotive Works, Derby, was educated at Lancing College. He joined the G.W.R. as a premium apprentice in 1920, and later obtained experience in the test room before being appointed to the drawing office in 1926. He joined the L.M.S.R. in 1935 as a Technical Assistant on the headquarters staff of the Chief Mechanical Engineer, and later in the same year was appointed Mechanical Inspector on the same staff. In 1938 he became Assistant to Works Superintendent, Horwich Locomotive Works, and he was made Assistant Works Superintendent in 1942. Mr. Burrows is a member of the committees of the North Western Branches of the Institution of Mechanical Engineers and the Institution of Locomotive Engineers.

Mr. M. G. Burrows

Appointed Assistant Works Superintendent, Locomotive Works, Derby, L.M.S.R.

We regret to record the death on April 12 of Mr. John Rowland Torrance, a Director of Stothert & Pitt Limited.

The Council of the Iron & Steel Institute has awarded the Bessemer Gold Medal for 1946 to Mr. J. S. Hollings, a Director of Guest Keen Baldwins Iron & Steel Co. Ltd.

Sir Clive Baillieu has been elected President of the Federation of British Industries for a second year of office.

Southern Railway Staff Changes

Solicitor's Office

Mr. H. A. Lemon, Assistant to Solicitor, to be Assistant Solicitor (Conveyancing), in succession to Mr. J. W. Watkin, retiring on April 30.

Chief Accountant's Office

Mr. R. W. Kemp, Special Assistant to Accountant, to be Chief Book-keeper.

Mr. F. W. Case, Special Assistant to Accountant, to be Assistant to Audit Accountant.

Mr. Ellis Rawdin Brown, A.M.I.Mech.E., A.M.I.Loco.E., Assistant to Works Superintendent (Inspection), Locomotive Works, Derby, L.M.S.R., who, as recorded in our March 8 issue, has been appointed Assistant Works Superintendent, Locomotive Works, Horwich, was born on February 4, 1908, and received his general education at Derby and in Switzerland, and his technical education at Derby Technical College, of which he was awarded the certificate and diploma. He was an apprentice, 1924-25, and a privilege apprentice, 1925-29, at Derby Locomotive Works. He then served in the drawing office until 1931, when he was transferred to the Chief Mechanical Engineer's headquarters staff, Euston. He assisted the Chief Technical Assistant, and subsequently served as Personal and Technical Assistant to C.M.E. In January, 1941, he was appointed Chief Inspector (Aircraft) in the Locomotive Works, Derby, and, in the next November, Assistant to Works Superintendent (Inspection), Locomotive Works, Derby. From 1940 up to his present appointment Mr. Brown was Lecturer in Machine Design at Repton School.

Mr. E. R. Brown

Appointed Assistant Works Superintendent, Locomotive Works, Horwich, L.M.S.R.

South African Railways & Harbours

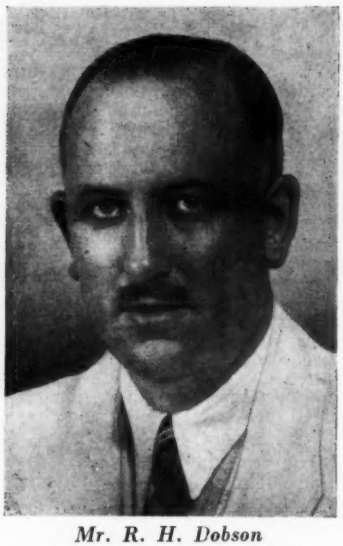
Mr. R. Thomson, Superintendent (Operating), Port Elizabeth, has been appointed Superintendent (Operating), Pretoria.

Mr. J. G. Grove, Superintendent (General & Rates), General Manager's Office, has been appointed Superintendent (General), General Manager's Office.

Mr. P. G. Joubert, Assistant Superintendent (Operating), Pretoria, has been appointed Superintendent (Operating Research), General Manager's Office.

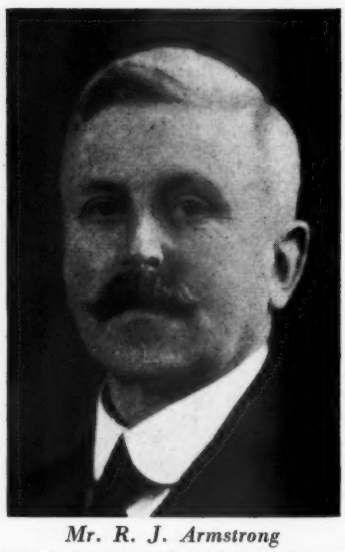
Mr. E. H. Wright, Chief Clerk (Operating), General Manager's Office, has been appointed Superintendent (Operating), General Manager's Office.

Mr. R. W. Carlisle, Production Engineer, Pretoria (recently seconded as Assistant Controller of Ship Repairs, Cape Town), has been appointed Mechanical Engineer, Salt River.



Mr. R. H. Dobson

Appointed General Manager, Great Western of Brazil Railway



Mr. R. J. Armstrong

Divisional Locomotive Superintendent, Worcester, G.W.R., 1929-46

Mr. E. T. J. Evans

Works Manager, Carriage & Wagon Works, Swindon, G.W.R., 1922-46

Mr. Richard Henry Dobson, M.Inst.T., Traffic Manager, Great Western of Brazil Railway, who, as recorded in our April 12 issue, has been appointed General Manager, was educated at King James I Grammar School, Bishop Auckland. He served in the Traffic Department of the London & North Eastern Railway from 1918, and joined the Great Western of Brazil Railway in 1929. He was appointed Assistant Traffic Manager of the latter railway in 1931, and was largely responsible for the introduction on the railway of the system of telephonic traffic control with diagrams in 1934. Mr. Dobson was appointed Traffic Manager in 1936.

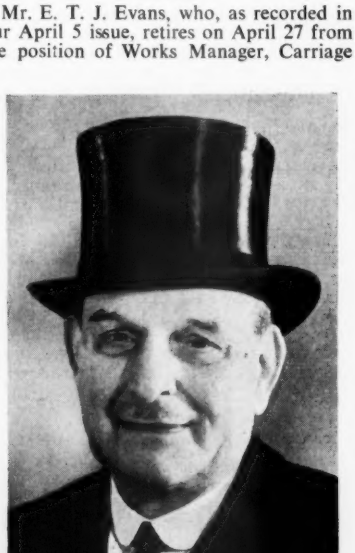
Mr. R. J. Armstrong, who, as recorded in our April 5 issue, retires on April 29 from the position of Divisional Locomotive Superintendent, Worcester, Great Western Railway, entered the company's service in 1896. He was appointed Assistant Locomotive Superintendent, Swindon, in 1910, and to a similar position at Bristol in 1912. He became Divisional Locomotive Superintendent, Bristol, in 1919, and Divisional Locomotive Superintendent, Worcester, in 1929. With the retirement of Mr. Armstrong there ends a long family connection with the G.W.R. (to which further reference is made in an editorial note in this issue). Mr. Armstrong's grandfather, Mr. Joseph Armstrong, who came from the same village as George Stephenson and Timothy Hackworth, and was at the same school as Robert Stephenson, succeeded Sir Daniel Gooch as Locomotive Superintendent of the G.W.R., a position he held until his death in 1877. Mr. Armstrong's great uncle, Mr. George Armstrong, was Locomotive Superintendent, Northern Division, G.W.R., and his father, Mr. John Armstrong, M.V.O., was Divisional Locomotive Superintendent, Paddington, having had 50 years' service.

Mr. E. T. J. Evans, who, as recorded in our April 5 issue, retires on April 27 from the position of Works Manager, Carriage & Wagon Works, Swindon, Great Western Railway, joined the service as an apprentice in 1896. On completion of his apprenticeship he served a short time in the testing house, and in 1903 entered the drawing office. In 1916 he was made a Locomotive Factory Inspector, and three years later was appointed Assistant Divisional Superintendent at Wolverhampton. In the next year he was made Assistant Manager of the Carriage & Wagon Works at Swindon, and in 1922 was appointed Manager.

Mr. H. Randle, Assistant Works Manager, Locomotive Works, Swindon, Great Western Railway, who, as recorded in our April 5 issue, has been appointed Works Manager, Carriage & Wagon Works, Swindon, served his apprenticeship in the Locomotive Works at Swindon, and, after a period in the drawing office, was appointed in 1927 to the Carriage & Wagon Works as Assistant to the Works Manager. In 1937 he was transferred to the Loco-

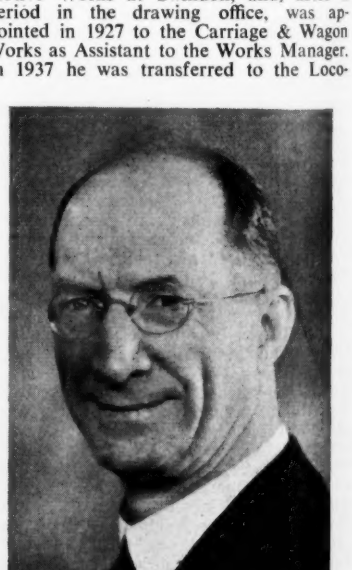
Mr. H. Randle

Appointed Works Manager, Carriage & Wagon Works, Swindon, G.W.R.



Mr. H. C. Greenfield

Stationmaster, Waterloo, Southern Railway, 1933-46



Mr. E. Mathews

Appointed Stationmaster, Waterloo, Southern Railway

motive Works as Assistant Works Manager. Mr. Randle served for a period in the R.N.A.S. and R.A.F. in the 1914-18 war, in Italy and Albania. In 1939 he formed and commanded the 5th A.A. Workshop Company, R.A.O.C. (T.A.). In 1941 he was released from the Army at the request of the G.W.R.

Mr. H. C. Greenfield, M.B.E., who, as recorded in our April 5 issue, retires on May 1 from the position of Stationmaster, Waterloo, Southern Railway, joined the L.S.W.R. in 1892 as a messenger boy in the Superintendent of the Line's Office, Waterloo. He later became a telegraphist, and, in 1899, a signalman. In the same year he was promoted to the travelling staff, and between 1900 and 1910 worked at every station in the outer London district. In 1910 he was promoted to the London district. In 1917 he was appointed Head Office Goods Train Inspector, and in 1921 Yardmaster & Stationmaster, Feltham. In 1925 he was promoted to Waterloo as Deputy-Stationmaster, and he became Stationmaster in 1933. Mr. Greenfield saw the colour-light signalling system introduced at Waterloo in 1933, and opened the all-electric signal box in 1936. In 1938 he received the M.B.E. for his services in connection with the Coronation period. Mr. Greenfield was Chief Air Raid Warden at Waterloo during the war, and recruited 637 members of the station staff for the L.D.V. He was a Company Commander in the Home Guard, which appointment he relinquished on reaching the age limit.

Mr. Ernest Mathews, Stationmaster, Clapham Junction, Southern Railway, who, as recorded in our April 5 issue, has been appointed Stationmaster, Waterloo, as from May 1, joined the L.S.W.R. in 1905 as a telegraph clerk at Eastleigh. After serving in the Stationmaster's Office there for some years, he was promoted in 1924 to be Chief Clerk in the Yardmaster's Office at Feltham marshalling yard. Two years later he went to Waterloo, as Chief Timekeeper, and subsequently became Assistant Stationmaster. Mr. Mathews was appointed Stationmaster, Clapham Junction, in 1943.

L.M.S.R. Staff Changes

The L.M.S.R. announces the appointment of Mr. J. B. Halley as District Engineer, Perth, in succession to Mr. R. W. Bailey.

Institute of Transport

Among those recently elected Members of the Institute of Transport are Messrs. J. W. B. Carter, System Manager, Cape Western, South African Railways & Harbours; H. A. Chapman, Assistant Solicitor, L.M.S.R.; D. J. J. du Plessis, System Manager, Pretoria, South African Railways & Harbours; H. Eccles, District Goods & Passenger Manager, Stoke-on-Trent, L.M.S.R.; F. Gilbert, Deputy Chief Officer for Labour & Establishment, Southern Railway; W. M. Hind, Assistant Director of Finance (Railways & Canals), Ministry of Transport; L. E. Marr, Passenger Manager (Scottish Area), L.N.E.R.; Sir Arnold Musto, Regional Transport Commissioner, Midland Region; Messrs. J. H. Scott, General Manager, Grand Canal Company; C. E. Shaw, District Goods Manager, Swansea, G.W.R.; F. M. Williams, Relief System Manager, South African Railways & Harbours; and A. J. Romer, Director, Bristol Tramways & Carriage Co. Ltd. Those elected Associate Members include Messrs. G. R. Raju, Assistant Commercial Manager (General), Madras & Southern Mahratta Railway; and J. N. Stainthorpe, L.N.E.R.

Presentation to Mr. A. F. Bound

At a recent gathering at the Euston Hotel, presided over by Mr. W. Wood, Signal & Telegraph Engineer, L.M.S.R., Mr. A. F. Bound, who until his retirement held the position of Signal & Telegraph Engineer, L.M.S.R., was presented with a cheque on behalf of the members of the headquarters and divisional offices of the department. Mr. Wood, in making the presentation, referred to Mr. Bound's connection with both the L.N.E.R. and L.M.S.R., and wished him good health and long life in which to enjoy his well-earned retirement. This was supported by the divisional engineers, past and present. Mr. Bound, in reply, mentioned a number of signalling and allied schemes with which he had been associated, and felt sure that the high standard of efficiency of the department would be maintained.

We regret to record the death, on April 13, at the age of 82, of Sir James Lyne Devonshire, K.B.E., M.I.E.E., M.Inst.T., a former Director of the Underground Electric Railways Co. of London Ltd.

Mr. A. Jessop, Assistant (Outdoor) to the Chief Commercial Manager, L.M.S.R., has been appointed to the panels of the Halifax Corporation & L.M.S.R. & L.N.E.R. Joint Omnibus Committee; Huddersfield Corporation & L.M.S.R. Joint Omnibus Committee; and Sheffield Corporation & L.M.S.R. & L.N.E.R. Joint Omnibus Committee.

Indian Railway Staff Changes

Colonel H. W. Wagstaff, Member, Staff, Railway Board, proceeds on retiring leave in July. Khan Bahadur Z. H. Khan has been appointed to officiate in his place.

Mr. I. S. Puri, Director of Finance, Railway Board, has been appointed to officiate as Financial Commissioner of Railways, in place of Mr. A. C. Turner, proceeding on six months' leave out of India.

Mr. H. J. Mulleneux, Chief Electrical Engineer, G.I.P.R., has been granted two years' leave preparatory to retirement as from January 7.

Ministry of Civil Aviation

The organisation of the Ministry of Civil Aviation has been regraded in accordance with that of a first class Department of State, and the Minister of Civil Aviation has approved the following appointments:—

Permanent Secretary: Sir Henry Self.

Deputy-Secretary: Mr. W. C. G. Cribbett.

Chief Aeronautical Adviser: Air Chief Marshal Sir Frederick W. Bowhill (assumes his appointment on July 1).

Under-Secretary: Mr. A. H. Wilson.

Director-General of Technical Services: Air Vice-Marshal A. C. Collier.

The posts and titles of Director-General, and Deputy Director-General, of Civil Aviation have been abolished.

Mr. B. P. Cheltenham has been appointed contact officer, in the steel manufacturing, constructional, mechanical and electrical engineering industries, on the staff of the British Export Trade Research Organisation. Mr. C. K. Squires has been appointed Manager of the B.E.T.R.O. in the Scandinavian countries.

G.W.R. Appointments in Order of St. John

Mr. F. W. Harris, who retires on April 29 from the position of Divisional Locomotive Superintendent, Oswestry, Great Western Railway, has been admitted to the Order of St. John of Jerusalem as Serving Brother. Mr. Harris was awarded the G.W.R. 15-year gold efficiency medal in 1944. The following members of the G.W.R. staff also have been admitted to the Order as Serving Brothers:—

Messrs. H. A. Evans, Divisional Ambulance Secretary, Swansea Division; F. C. Lewis, clerk, District Goods Manager's Office, Gloucester; W. Mogridge, shunter, Traffic Department, Bristol; W. J. Franklin, Inspector, Police Department, Paddington; G. Stallard, Inspector, Chief Goods Manager's Office, Paddington; E. E. George, signalman, Traffic Department, St. Ives.

Mr. E. D. B. Keefe, Oxford Divisional Ambulance Secretary, London "B" Division, Mr. S. Elms, Divisional Ambulance Secretary, Newport "A" Division, until his retirement last year, and Mr. J. H. Cadwallader, Divisional Ambulance Secretary, Newport "B" Division, have been promoted in the Order to the grade of Officer (Brother).

L.N.E.R. Staff Changes

Mr. R. J. M. Inglis, Divisional General Manager, Scottish Area, is retiring on May 3.

Mr. T. F. Cameron is confirmed in the position of Divisional General Manager, Scottish Area.

Mr. C. P. Hopkins is confirmed in the position of Assistant General Manager (Traffic & Statistics).

Mr. J. Ness is confirmed in the position of Assistant General Manager (Works & General).

In connection with the re-organisation of the Purchasing Agent's Department, Mr. C. W. Stokes, Assistant to Chief Accountant (Stores), has been appointed Assistant Purchasing Agent.

Mr. C. W. Murphy, Resident Manager, Royal Hotel, Grimsby, and District Refreshment Room Manager, Grimsby District, has been appointed Area Refreshment Room Supervisor (Area No. 2), with headquarters at Kings Cross.

Mr. A. R. Dunbar, District Superintendent, Manchester (Acting Assistant Superintendent, Eastern Section, Southern Area), has been appointed Senior Assistant Superintendent, Southern Area.

Mr. H. C. Johnson, Acting Assistant Superintendent (Western Section), has been appointed Second Assistant Superintendent, Southern Area.

Mr. R. B. Temple, District Goods & Passenger Manager, Lincoln, has been appointed District Goods Manager, Leeds, in place of Mr. H. R. Statham, recently appointed District Goods & Passenger Manager, Glasgow.

Subsequent to the reorganisation of the Divisional General Manager's Office, North-Eastern Area, Mr. H. Bell, Acting Chief Staff Clerk, Traffic Officer's Headquarters Joint Staff Section, York, has been appointed Head of Works Section, Divisional General Manager's Office, North Eastern Area.

Mr. G. W. Anson, Yardmaster, Hull West (Acting Assistant District Superintendent, Newcastle), has been appointed Stationmaster, York, in succession to Mr. E. O. Wright, recently appointed Depot Agent, Darlington.

Mr. F. C. Margetts, District Superintendent, Burntisland, has been appointed Assistant Superintendent, Scottish Area, in succession to Mr. H. G. Sayers, recently appointed Superintendent, Scottish Area.

Ministry of War Transport Accident Report

Carcroft, L.N.E.R. : October 31, 1945

Lt.-Colonel E. Woodhouse inquired into the accident which occurred at 11.15 a.m. on October 31, 1945, at Carcroft, L.N.E.R., when the 9.55 a.m. express, Bradford to Kings Cross, composed of 12 bogie coaches drawn by two outside-cylinder engines Nos. 4633 of the "K2" 2-6-0 type (leading) and 6098 of the "B4" 4-6-0 type, left the rails, as a consequence of damage to the track caused by a failed big end on the leading engine allowing the connecting rod to fall. The train had seating accommodation for 500 and was well loaded. The enginemen escaped with bruises and no passenger was injured. A down freight train was stopped clear of the obstruction by prompt action. Both tracks were extensively damaged. The second engine overturned. The leading eight coaches passed under an overbridge at the up end of the station and fortunately remained in line while doing so, but the sixth coach partly overturned after passing the arch. There was no telescoping. The entire absence of personal injury in a well-filled train, completely derailed at high speed, was a remarkable feature of the accident and is ascribed by Colonel Woodhouse to the strength of the Buckeye couplings which kept the train substantially in line and to the absence of permanent way connections ahead of the trailing connection at the beginning of the platform, in which the failed big end no doubt became wedged between stock and switch rails. Both sets of enginemen felt their engines leave the rails at about this point. The derailed coaches might otherwise have been deflected and a heavy casualty list then would have resulted.

Arrangement of the Big End

The arrangement of the big end in the "K2" class engines is shown in the accompanying drawing. A glut piece secured by a through bolt retains the crank pin brasses in the connecting rod jaws, a 1 in 16 taper main cotter, between glut piece and back iron, providing a means of solid assembly after remetalling or setting together of brasses. The main cotter is clamped by two $\frac{5}{8}$ in. set screws, case hardened at the tip, with split cotter beneath the lower jaw. The design is of G.N.R. origin and has long been in use. In the failed big end there were 3 packing shims (total thickness nearly $\frac{1}{4}$ in.) between rear brass and back iron, to compensate for metal removed and keep the main cotter at the appropriate height. The hole for the upper clamping screw had been enlarged to $\frac{1}{4}$ in.

The report gives a detailed account of the damage sustained by the engine. The piston is considered to have been at or behind mid-stroke when certain signs of damage were made. The lower jaw of the forked end of the connecting rod was bent upwards $\frac{1}{4}$ in. and badly battered underneath; the bottom clamping screw was missing. The upper jaw, bent upwards slightly, had the top clamping screw in place, with tip burred over into the semblance of a bad rivet. The bolt had broken where it entered the lower jaw; its upper part, distorted at the neck by hammering, was bent towards the rear. Most of the remaining components of the big end were found nearly 2 miles short of the point of derailment and the main cotter 3 miles back. The lower clamping screw, also the head and tip of the split cotter, have not been found. The sketch shows how the main cotter was bent, in a forward direction; there had been considerable heating of a badly abraded area at the lower end of the clamping screw groove. Damage to and marking on the permanent way showed that the big end, when trailing along the sleeper end, first struck the switch anchor of the trailing connection and then had been dragged into the angle between the connecting stock rail and switch rail, wedging them apart and breaking the slide chairs, for the stock rail—normally curving to the left—was bent into a right hand curve.

The Course of Events

The evidence of those closely concerned threw little light on the immediate circumstances of the derailment. The Carcroft signalman, watching the train approach, noticed nothing to indicate that the big end was dragging along the track. Speed was about 50 m.p.h. A "crunching noise" as the train ran through attracted his attention, when the engine was about half way down the platform, and the de-

Arrangement of big end in "K2" class locomotives and plan of site of accident

railment followed. A ganger found the track in order an hour beforehand. The fireman of the second engine, looking out on the left as they approached, noticed nothing amiss with the engine ahead, but he and his driver felt their engine leave the rails as it entered the station. The leading enginemen were also unaware of anything unusual, but the driver "felt a thud and heard a grinding noise" as they entered the platform. He had been running down the gradient with steam shut off until about 5 miles from Carcroft, when he re-opened the regulator slightly, shutting it again 3 miles further on. He was having difficulty with the injector on his side; the other one was out of order. This was not the only defect on the engine, he said; there was considerable knocking from the motion and axle boxes. This, he suggested, was why he had not detected that there was anything adrift, though he agreed that the "K2" engines were more prone to knock and clank when running than other types. He was used to working on this class, but had not driven No. 4633 previously.

It was his invariable practice, when coming on duty, to check tightness of cotter clamping screws on big ends and verify that the split cotter was in place. On this occasion he had tested for tightness with his fingers only and not with a spanner. There was none on the engine to fit them. He hit the split cotter and was sure it was "hard up against the underside of the big end." There was always a shortage of hand tools at Bradford and it was doubtful if he could have obtained a spanner to fit the clamping screws. He had not asked for one that day, believing it to be useless and having done so previously without success.

The company's officers agreed that maintenance of an adequate stock of serviceable hand tools had been very difficult under war conditions, but every endeavour had been made to overcome shortages.

The examining fitter, who had seen the engine early that morning, found no defects except a loose slide-bar bolt, which was put right. Testing the cotter clamping screws on the left big end by tapping with a hammer, he found they were tight; the split cotter was intact and firmly bedded against the underside of the rod. Its ends were properly bent out. He could not account for the big end coming adrift and had never heard of a similar case in his 15 years as examining fitter. While any clearance existing between the split cotter and rod should, strictly speaking, be taken up by dismantling the big end and inserting an additional shim—with which statement the company's officers concurred—it was sometimes the practice to insert a washer or ferrule above the cotter when there was not time for a longer operation.

Inspecting Officer's Conclusions

Tightness of the main cotter clamping screws is the main safeguard against such an occurrence. That the lower one disappeared indicates that the examining fitter was wrong in concluding that they were both properly screwed up; a test by spanner might well have revealed that they were not so tight as he imagined. His judgment was to this extent at fault and some responsibility rests on him. Examination led to the conclusion that the missing lower clamping screw may have had a worn thread, allowing it to work out once vibration had slackened its frictional grip, but the main cotter should have been kept in by the split cotter as well as by the two clamping screws, even if the latter were not holding it firmly. Colonel Woodhouse considers that it could not have been fitted against the underside of the rod jaw as firmly as was suggested. This, coupled with inadequate screw grip, allowed the main cotter to slack back slightly. At high speed, with the big end components thus loosened and "working," the tapered main cotter would tend to be driven out of the rod with considerable force, and the head and tip eventually broke off. The driver's test of screw tightness by using his fingers was useless. Investigation showed the hand tool situation to be less bad than he suggested, though there was some shortage. During a check period from 10.0 p.m. to 10.0 a.m., 38 tool kits were issued at Bradford depot to drivers taking duty; each contained a shifting spanner and suitable assortment of fixed spanners. It is felt that the driver, a man with a good record, took too much for granted and that some measure of responsibility rests on him also. It is strange that so experienced a man should have failed to realise from the sound and "feel" of the engine that something was seriously amiss, either when the main cotter escaped or when the big end and crank pin parted company. It is reasonable to assume that this was partly due to the poor condition of maintenance of the engine, which was knocking badly, according to the driver's evidence, and partly to preoccupation with the injector. The engine had run 23,350 miles since its last general repair, a year earlier. Among defects booked by 12 different drivers during the 9 days before the accident the left-hand injector figured 7 times. Knocking of big ends and axleboxes was booked by one driver, and on 4 occasions examining fitters referred to loose slide bar bolts. The engine was clearly not in the state of repair desirable for express passenger service. It is feared that this is by no means an isolated example of the general deterioration in the standard of locomotive maintenance as a result of war conditions and continued shortage of efficient repair staff. Improvement in this respect is clearly a matter of first importance if arrears are to be overtaken in any reasonable time.

Remarks

The report devotes considerable space to an analysis of the probable course of events from the first signs of weakness beginning to make themselves felt to the final collapse of the big end and consequent dragging, with particular reference to the condition of such parts as were found and especially the bending of the main cotter, which was discovered at about the point where the regulator was re-opened. It had, it is considered, been subjected to rapid oscillation—although for how long can only be surmised—and that the altered conditions of piston load and cushioning produced by opening the regulator were such as to force the cotter past the badly worn and distorted clamping screw tip and completely out of the rod. The resultant increased clearance accentuated the hammering and pounding, leading to breakage and distortion of the big end bolt (and possibly fracture of the front brass also), leading to complete collapse of the assembly when steam was again shut off. "The incident provides," says the report, "a useful illustration of the inertia forces to which some of the moving parts of a locomotive are subjected."

The design of big end in question has been in use on many of the company's outside cylinder engines for over 40 years—100 are still so equipped—and Colonel Woodhouse was informed that it had proved entirely satisfactory. "Nevertheless," the report observes, "in any big end design in which use is made of a tapered main cotter to hold the brasses together and up to their work, firm clamping of the cotter by the set screws is clearly essential; this applies equally to the type, extensively employed on inside cylinder engines, in which the connecting rod has a solid end to which a heavy U-shaped strap embracing the brasses is bolted. It appears that this important matter does not invariably receive proper attention, for the company's records show that during the first ten months of 1945 there were 6 cases of failure of big ends of the forked pattern now under consideration, due to the main cotter being improperly secured and escaping from the rod; three of these failures occurred on "C1" class (Atlantic) engines and three on "K2" class engines, to which No. 4633 belongs."

While this has arisen no doubt from war conditions and shortage of skilled staff, the attention of all concerned should be drawn to this elementary matter. Stress might also be laid, Colonel Woodhouse considers, on the need for assembling the bearing, with packing shims if necessary, in such a way that the split cotter bears firmly against the underside of the rod. The object of the split cotter is to retain the main cotter and prevent any substantial easing back of it if the grip of the clamping screws slackens, rather than to assist the latter, but when the parts are loose and "working," the severity of the hammering and consequent shearing action to which the split cotter may be subjected, due to the tapered shape of the main cotter, will be lessened if the preliminary easing back of the main cotter is kept to a minimum. Once the bearing is properly assembled there is no reason why clearance between split cotter and rod should increase; there is no object in subsequently endeavouring to hammer the main cotter down, for this will not take up any wear in the bearing that may develop in use.

When this design of big end was originally adopted by the G.N.R., the main cotter had two short grooves for the clamping screw tips, instead of one long one extending over nearly its full length. The earlier pattern seems preferable, for upwards movement of the main cotter will be arrested by simultaneous contact with both clamping screws and the ends of the grooves, if their grip has loosened and the split cotter also has given way. With a single groove the lower screw receives no assistance from the upper in checking such movement.

This accident may fairly be regarded as mainly due to cumulative effects of the war.

Toronto Underground Railway.—The underground railway for Toronto, recently approved by the city electors, at an estimated cost of $24 million, is to be built as an underground line for about two-thirds of its length. The remainder will be open cut. The decision was taken as a result of discussions between the Toronto Transportation Commission (which operates the city tramway system) and the Board of Control of the city council.

Mile-a-Minute Runs in Belgium.—From the beginning of April, three trains have been running daily in each direction between Brussels and Antwerp, Belgian National Railways, covering the 27·4 miles in each direction daily in 25 min. The start-to-stop speed involved is 65·6 m.p.h., and these are probably the first mile-a-minute bookings to be restored in any part of Europe since the war. Each of these high-speed trains consists of a two-car electric unit.

Government Control of Railways

The White Paper (Cmd. 6797. H.M. Stationery Office, 1d.) giving estimates of the pooled revenue receipts and expenses and resultant net revenue of the controlled railway undertakings for the year ended December 31, 1945, states that the estimated pooled receipts and expenses, including the standardised maintenance charges (see paragraph 5 below), for the year ended December 31, 1945, were approximately as follow:—

Receipts and expenditure of the controlled railway companies and joint lines in respect of railway working and of the London Passenger Transport Board in respect of railway working and road services :	£
Receipts : Passenger	210,556,000
Freight	169,663,000
Miscellaneous	3,662,000
Total	£383,881,000
Expenditure	316,982,000
Net receipts	66,899,000
Other receipts and expenditure included in the pool (net)	Dr. 4,352,000
Net revenue of the pool	£62,547,000

The figures are subject to adjustment when receipts and expenditure have been finally ascertained.

The item "Other receipts and expenditure including in the pool (net)" includes the net revenue from ancillary businesses (e.g., steamboats, docks, hotels, collection and delivery of parcels and goods) and rents, interest and other miscellaneous items.

The fixed annual sums payable by His Majesty's Government to the controlled undertakings amount to £43,469,000.

Under the provisions of the control agreement, charges for maintenance (including renewals) are standardised on the basis of an average pre-war charge adjusted for variations in assets in service and in price levels and are borne as pooled expenses. If the actual maintenance expenditure of any of the controlled undertakings in any year of control is less than the standardised charge, the difference, representing arrears of maintenance, is paid into a trust fund set up under Article 19 of the agreement. The amounts in the trust funds at December 31, 1945, were approximately as follow:—

Trust fund	Arrears of maintenance, etc.	Interest (net)	Total balance
	£	£	£
S.R.	21,468,000	623,000	22,091,000
G.W.R. ...	18,267,000	548,000	18,815,000
L.M. & S.R. ...	34,689,000	1,042,000	35,731,000
L.N.E.R. ...	38,385,000	1,238,000	39,623,000
L.P.T.B. ...	31,101,000	859,000	31,960,000
	£143,910,000	£4,310,000	£148,220,000

"Artificial Rain" for L.P.T.B. Braking Tests

Acceleration and braking tests on trains of the London Passenger Transport Board have been made for some years on a section of track on the Hounslow line. It is necessary to make the tests under both wet and dry conditions; but it was early found that there was frequently considerable delay as rainfall rarely coincided with the limited time available for the tests. A device for simulating moderately heavy rain, therefore, has been fitted on the track. It consists of two pipes, one on either side of the track, fitted with spray nozzles which are supplied with water from a pump. The pipes are of 1 in. diameter and are fitted with nozzles 3 ft. 6 in. apart. They are spaced 2 ft. 6 in. outward from, and 1 ft. 3 in. higher than, the running rails. The nozzles are designed to give a fan-shaped spray and are so adjusted that the fan is at 45 degrees to the vertical plane across the pipe and pointing 15 degrees upwards from the horizontal.

The water is led through meters to a 1,000-gallon tank, passes through a stop cock, an electrically-driven pump to boost the pressure, and a second manually-controlled stop-cock, which is used as the main stop-cock during tests. It is then forced through a main 4 in. diameter supply pipe to the centre of the test section. It divides and passes to 3 in. pipes for the middle 800 ft. on either side, and into 2 in. pipes for the remaining outer lengths. These supply pipes feed the spray pipe, each through 14 connections 115 ft. apart.

The operator is warned of the approach of the train by a bell, controlled by the passage of the train, in time for him to open the main cock fully. He already will have opened the cock sufficiently to fill the nozzle pipes and produce a slight drip at the nozzles. The train enters the 800-ft. sprayed section before the point of brake application, with a heavy spray, continued until the train stops, completely covering the track approximately to the level of the underside of the coach. The spraying is normally for about ½ minute, but may be extended, and can be maintained fully and continuously for about 4 minutes.

Drain cocks, fitted at suitable points, are opened after each test. Water is flushed through the pipes at the commencement of a test and before closing the drain cocks, to wash clear any scale or rust. Additional cocks are provided before the storage tank to drain all water in frosty weather as far back as the Water Board main cock.

Staff & Labour Matters

Engineering Wages

Agreement was reached on April 3 between the engineering employers and the engineering trade unions on the claim presented by the unions for an increase of 20s. in basic rates; a 40-hour week; 12 days' annual holiday with pay and payment for six statutory holidays; and a guaranteed week. The agreement makes the following provisions.

National Wages

The national bonus of all adult male workers is to be increased by 6s. a week with consequential adjustments in the bonus of apprentices, boys and youths from the commencement of the first full pay period after April 15, 1946.

Annual Holidays

The conditions under which holidays with pay are granted are as follow:—

For the period covered by the agreement there shall be credited to every manual worker employed in a federated establishment in respect of holidays, for each full week's work performed, a sum representing one-fiftieth of the appropriate day time rate plus time-workers' national bonus for the time being.

A full week's work shall be a week of 47 hours.

When less than 47 hours' work has been performed in any week, there shall be credited the appropriate portion of the full week's allowance.

In respect of workpeople absent through sickness or accident the appropriate holiday allowance shall be credited for working hours so lost for a period up to six weeks in any one year.

These credits shall be accumulated in a special fund maintained by each firm and shall be payable to each employee at the recognised summer holiday period, or such other time as may be mutually agreed.

Bank Holidays

Payment is to be made at the appropriate day time rate plus the time workers' national bonus on six Bank or other holidays per annum.

Such six days shall synchronise with holidays specified or mutually arranged locally, in terms of the Payment for Work Done on Holidays Agreement dated July 23, 1943.

To satisfy domestic conditions establishments shall have the right by mutual agreement between the employer and his workpeople to vary days recognised as holidays locally or in terms of the National Agreement of July 23, 1943.

Guaranteed Week

All hourly-rated manual workers who have been continuously employed by a federated firm for not less than four weeks are guaranteed wages equivalent to their inclusive hourly plain time rate for 34 hours in any pay week, *provided that* they are capable of, available for and willing to perform satisfactorily, during working hours, the work associated with their usual occupation, or reasonable alternative work where their usual work is not available.

For the purpose of this guarantee premium payments for overtime worked on weekdays and premium payments for work done on Sundays and holidays shall be disregarded.

The guarantee does not apply in the following circumstances:—

(i) In the case of a holiday recognised by agreement, custom or practice, the guarantee shall be reduced in respect of the pay week in which the holiday takes place in the same proportion as the normal working hours for the time being have been reduced in that pay week.

(ii) In the event of a dislocation of production as a result of strike action the guarantee shall be automatically suspended in respect of workpeople affected in the establishment where the strike is taking place.

Victory Celebrations : June 8

Subsequent to the announcement by the Government that victory celebrations will be held on Saturday, June 8, which will be a public holiday, the railways have agreed with the trade unions that, subject to the maintenance of essential services, as many members of the staff as possible will be given leave with pay on June 8. The staff required to work on ordinary turns commencing between midnight on June 7 and midnight on June 8 will receive a day's leave with pay at a later date. In addition, staff working between midnight on June 7 and midnight on June 8 will receive payment at the inclusive rate of double time for all time worked, plus any balance of rostered duty, not worked, at ordinary rate of pay. Staff on annual leave on June 8 will be given a further day's leave with pay at a later date.

MEXICO-GUATEMALA BRIDGE.—It was reported recently from Mexico City that Mexico and Guatemala are taking steps to begin construction of a permanent railway bridge across the Suchiate River. The temporary trestle bridge built in 1942 to establish direct rail connection between the two countries was washed out by floods and has never been replaced.

Parliamentary Notes

Great Western Railway Bill

The Great Western Railway Bill, as amended, passed the report stage in the House of Commons on April 9, and was read the third time and passed on April 12.

London Midland & Scottish Railway Bill

The Chairman of Committees on April 9 informed the House of Lords that opposition to the London Midland & Scottish Railway Bill had been withdrawn.

Civil Aviation Bill

Mr. Ivor Thomas (Parliamentary Secretary to the Ministry of Civil Aviation) on April 2 presented to the House of Commons the Civil Aviation Bill, the object of which is "to make further provision with respect to civil aviation and matters connected therewith, and, in particular, to secure the development of air transport services by corporations operating under public control."

The Bill was formally read the first time.

Questions in Parliament

London-Glasgow Train Service

Mr. J. L. Williams (Glasgow Kelvingrove—Lab.) on April 8 asked the Minister of Transport whether he was considering running later trains from Glasgow to London, and from London to Glasgow, during the summer months and arranging for sleeping cars on those trains.

Mr. Alfred Barnes in a written answer stated: Yes. As from May 6, the L.M.S.R. proposed to run trains, with first and third class sleeping cars, from Glasgow to London (Euston) at 10.25 p.m. and 10.35 p.m. daily, and from London (Euston) to Glasgow at 11.35 p.m. on Mondays to Fridays, 11.25 p.m. on Saturdays and 11.45 p.m. on Sundays.

Restaurant Cars on Main-Line Trains

Mr. John Lewis (Bolton—Lab.) on April 9 asked the Minister of Transport if he was aware that there was insufficient restaurant accommodation for third class passengers on main-line trains throughout the country, and would he take steps to see that facilities provided for first class passengers in that respect should be accorded to third class passengers also.

Mr. Alfred Barnes stated in a written answer: At the present time the railways can run only a limited service of restaurant cars, but they endeavour to cater for both first and third class passengers, and on many trains both classes use the same restaurant cars. I am not aware of any discrimination in this matter between first and third class passengers. If Mr. Lewis has any particular case in mind and will let me know I will have inquiries made.

Crowd Control at Railway Termini

Mr. R. De la Bere (Evesham—C.) on April 8 asked the Minister of Transport what remedies he proposed to introduce in connection with crowd control to safeguard the public against accidents at railway termini while attending sporting events and traffic congestion on the roads throughout the holiday season.

Mr. Alfred Barnes: Having regard to the customary co-operation of the police with the railway authorities I have no reason to expect any difficulties in connection with the control at railway termini of crowds travelling to sporting events. As far as their resources permit, the police will take the necessary steps to promote the free and safe flow of traffic on the roads during the holiday season. In addition I confidently rely on the good sense and courtesy of all road users.

Mr. De la Bere: Cannot the Minister do something to impress on the public the great benefit of the wide open spaces and breezy uplands? Towns are very dangerous, and it is much better to get out into the country air.

Mr. Barnes did not reply.

Quarterly Season Tickets on Railways

Mr. George Wallace (Chislehurst—Lab.) on April 15 asked the Minister of Transport if he was prepared, in consultation with the Ministry of Labour, to consider making arrangements, through the appropriate channels, for quarterly season tickets on railways to be available to city workers on weekly repayment terms by deduction from wages by employers subject to the agreement of the employee.

Mr. Alfred Barnes: The suggestion appears to be that employers should purchase on behalf of their employees, or advance money to their employees to purchase, quarterly season tickets and recover the money by deductions from wages. This would be a matter for consideration by employers and their employees, and I am afraid that I am not in a position to take action to further its adoption.

Mr. G. Wallace: Could not the Minister take a benevolent interest in the suggestion?

Mr. Barnes: I am afraid my department is not qualified to take steps in this matter.

Railway Wagon Production

Mr. Hector Hughes (Aberdeen North—Lab.) on March 12 asked the Minister of Labour and National Service why he refused to release the apprentice urgently required by Messrs. Sparks, of Aberdeen, for highly-skilled work on Cleveland autolathes making parts for 20-ton railway wagons for U.N.R.R.A.; and if he would reconsider that refusal, in view of the facts that those wagons were needed to supply devastated Europe, that operators skilled in the use of those lathes were scarce, and that that scarcity was delaying the making of 153,300 parts of such 20-ton wagons for which Messrs. Sparks had orders.

Mr. George Isaacs (Minister of Labour and National Service): District manpower boards, in deciding deferments, are required to pay special regard to the importance of railway wagon production. The manpower board concerned, however, reached its decision in this case having regard to all its individual circumstances, including particularly the fact that the young man in question was transferred to railway wagon production only after his deferment had been cancelled in respect of his previous work, which was of an entirely different character. This young man of 19 cannot be described as a key man, and I do not propose to intervene to stop his call-up.

Post Office Public Relations Officer

Lt.-Commander Gurney Braithwaite (Holderness—C.) on April 11 asked the Assistant Postmaster-General what was the retiring age for the public relations officer of his department.

Mr. W. A. Burke (Assistant Postmaster-General): The post of public relations officer of the Post Office may be held by an established or an unestablished officer. There is no fixed retiring age in either case.

Lt.-Commander Gurney Braithwaite next asked the Assistant Postmaster-General what was the age of the new Public Relations Officer of his department; and what was that of his predecessor on retirement.

Mr. Burke: The incoming Public Relations Officer is 64 years of age. The outgoing Public Relations Officer will be 62 in May, 1946.

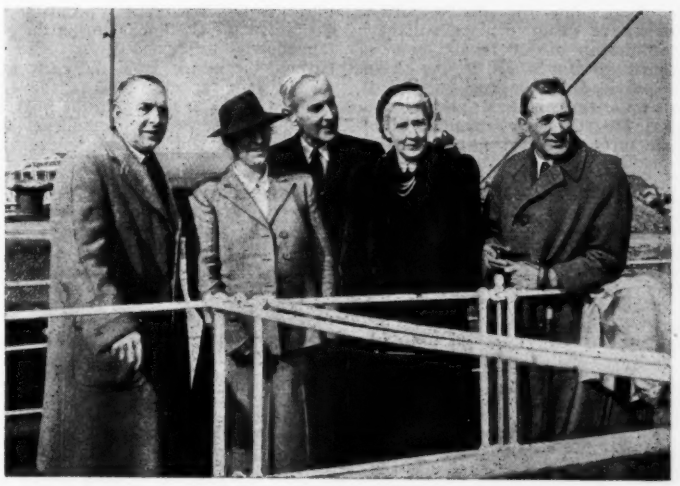
Lt.-Commander Braithwaite: Are we to understand that this exacting task of public relations is now to be regarded as suitable gainful employment for a superannuated Socialist ex-Minister?

Mr. H. W. Butcher (Holland with Boston—Lib. Nat.): Is it not a fact that this is an admirable appointment?

Wing-Commander Roland Robinson (Blackpool South—C.): Is it not a fact that this appointment was made purely on merit, and that this person is a first class public servant?

Mr. Burke: All Post Office appointments are made on merit, and this is one of the best.

Minister of Transport Visits Southampton



Left to right: Sir Eustace Missenden, General Manager, Southern Railway; Mrs. Gore Browne; Colonel Eric Gore Browne, Chairman, Southern Railway; Lady Missenden; and Mr. Alfred Barnes, Minister of Transport; on a recent visit to Southampton Docks

Notes and News

Churchill Machine Tool Co. Ltd.—The company has declared a final dividend of 15 per cent., making 30 per cent. for 1945, the same as in the previous year.

Senior Draughtsman Required.—A good position is available for a senior draughtsman who has had experience in design of locomotive accessories. See Official Notices on page 471.

Draughtsman (Mechanical Engineering) Required.—A draughtsman is required in the Manchester district for layout and development work on accessories for locomotives and railway vehicles. See Official Notices on page 471.

Birmingham Railway Carriage & Wagon Co. Ltd.—Trading results for 1945 show a profit of £88,096 (including refund of E.P.T.), compared with £85,016 in the previous year. The carry-forward is £91,802, as against £92,916. An ordinary dividend of 7½ per cent. is being paid as in the previous year.

Institute of Transport Graduates and Students.—The Council of the Institute of Transport has adopted a recommendation of the Membership Committee that, except with the permission of the Council, graduates and students elected after October 1, 1946, shall not be permitted to remain in those grades for more than five years without attempting the associate membership and graduateship examinations, respectively.

Stratfordians' Association.—A re-union dinner of the past and present staff of the Chief Mechanical Engineer's Department, Stratford, L.N.E.R., will be held at the Great Eastern Hotel, Liverpool Street, E.C.2, on May 31 (6.45 for 7.0 p.m.) (morning dress). Applications for tickets should be made as early as possible, but in no case later than April 30, to the Honorary Secretary, Mr. A. W. Headley, C.M.E. Department, L.N.E.R., Stratford, London, E.15.

New Ships for G.W.R. Cross-Channel Services.—The keels of two new 3,000-ton cross-Channel passenger and cargo ships for the G.W.R. are being laid this month by Cammell Laird & Co. Ltd. and are expected to be in service in about 15 months. The ships, which will be driven by Parsons type steam turbines, will have an overall length of 320 ft. and a speed of 21 knots. Steam at 250 lb. per sq. in. will be provided by Babcock & Wilcox oil-fired water-tube boilers, and electric current at 220 volts will be generated by an Allen turbo-generator augmented by two diesel generators. Each vessel will accommodate 1,300 passengers, and there will be sleeping quarters for 400 in single, double, or open berths, in addition to cabins fitted with private bathrooms. A total of 50 motor cars and 350 tons of freight will be carried. The new ships are to replace the *St. Patrick* and the *St. Andrew*, which were lost during the war.

Superheater Co. Ltd.—Net trading profit of the company for 1945, after taxation, was £133,904, compared with £121,044. A final dividend of 27½ per cent. is being paid on the ordinary and "A" ordinary shares, making 42½ per cent. for the year, as compared with 40 per cent. in 1944.

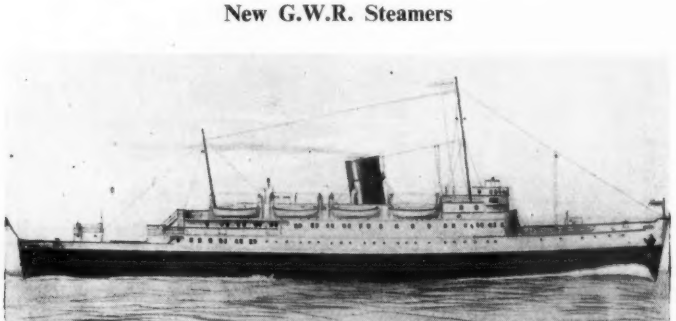
Vulcan Foundry Limited.—The ordinary dividend of 5 per cent., less tax, for 1945 is the same as in the preceding year. Profit for 1945 was £189,933, against £221,810. After taxation and dividends, £45,782 is carried forward, comparing with £45,451 brought in from the preceding year.

Continental Boat Trains.—The Newhaven boat trains were transferred to platform 8 on the Chatham side at Victoria Station on Monday, April 15, coincidently with the inauguration of the "Golden Arrow" service. There is a cross-over from the Eastern (Chatham) to the Central (Brighton) Section local lines outside Victoria Station. The Newhaven boat trains use this and then use the local Brighton line to Balham where they cross over to the fast line.

Ministry of War Transport (L.N.E.R. Filey Camp Branch) Order, 1946.—On March 26 the Minister of War Transport made an Order (entitled "The Ministry of War Transport (London & North Eastern Railway) (Filey Camp Branch) Order, 1946") authorising the Construction of Railways and the Compulsory Acquisition of Lands for that purpose in the Parish of Hunmanby in the Rural District of Bridlington, and in the Urban District of Filey, in the East Riding of the County of York, by the London & North Eastern Railway Company, and incidental matters.

Stewarts and Lloyds Steel Pipelines for Pluto.—On April 17 a film was shown in London entitled "Job 99—Pluto," which covered the production of the Hamel steel pipelines which conveyed oil from Great Britain to the Continent during the period immediately after D-Day. The film covered the period from the early experimental stage at the Stewarts and Lloyds Limited works at Corby, to the final winding of the pipe on the Conundrums at the Tilbury Dock site. It was noteworthy as a record of the painstaking research and experiment, and the skill and care in manufacture which enabled the Pluto pipelines to play their essential part in servicing Allied Forces on the Continent of Europe. Every stage of production was shown in the film. The experience gained in the manufacture of the Pluto pipelines obviously must be valuable to the company for the production of peacetime products. It is understood that arrangements are being made for copies of the film to be shown overseas, where it should enhance the prestige not only of Stewarts

New G.W.R. Steamers



A total of 1,300 *passengers and* 350 *tons of freight will be carried on this new G.W.R. cross-channel steamer* (*see paragraph above*)

British and Irish Railway Stocks and Shares

Stocks	Highest 1945	Lowest 1945	Prices Apr. 23 1946	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	60⅜	47½	55½	— ½
5% Con. Pref. ...	124½	104½	113	+ ½
5% Red. Pref. (1950)	107⅜	101½	103	—
5% Rt. Charge ...	137½	120	126½	—
5% Cons. Guar. ...	135½	117	122½	—
4% Deb.	118	106	112	+ ½
4½% Deb.	119½	108	112½	—
4½% Deb.	124½	111½	117	—
5% Deb.	138	124	127	—
2½% Deb.	83	74½	85½	+ 1
L.M.S.R.				
Ord.	33	23½	27½	— ½
4% Pref. (1923) ...	65	50	57½	— ½
4% Pref.	80⅛	69½	79½	—
5% Red. Pref. (1955)	106½	99½	101½	—
4% Guar.	106½	97	103½	+ 1
4% Deb.	110½	102	107½	+ ½
5% Red. Deb. (1952)	110½	103½	105½xd	— 1
L.N.E.R.				
5% Pref. Ord. ...	8½	5½	6	—
Def. Ord.	4½	2⅜	3	—
4% First Pref. ...	62½	49½	56½	+ ½
4% Second Pref. ...	33½	24½	27½	— 1½
5% Red. Pref. (1955)	103	96	97	—
4% First Guar. ...	104½	95	101	+ 1
4% Second Guar. ...	97	89½	94	+ 1
3% Deb.	91⅜	82½	94	+ 1
4% Deb.	109½	101	107½	+ 1
5% Red. Deb. (1947)	103½	100	100	—
4½% Sinking Fund Red. Deb.	106⅜	103	103½	—
SOUTHERN				
Pref. Ord.	79½	63	75½	— ½
Def. Ord.	27	20½	21½	— ½
5% Pref.	124½	104	112½	+ ½
5% Red. Pref. (1964)	117	107	108½	—
5% Guar. Pref. ...	135⅜	117	122½	+ 1
5% Red. Guar. Pref. (1957)	117	106½	108½	—
4% Deb.	117	104½	110½	+ ½
5% Deb.	137	124	126½	—
4% Red. Deb (1962-67)	112	104½	106½	—
4% Red. Deb. (1970-80)	113½	104	107½	—
FORTH BRIDGE				
4% Deb	106	103	103	—
4% Guar.	106	101	102	—
L.P.T.B.				
4½ "A"	125	117	123½	—
5% "A"	135	127	133½	—
3% Guar. (1967-72)	100	97½	103½	+ ½
5% "B"	125½	115	118½	—
"C"	70	58	61	+ 1
MERSEY				
Ord.	37	31½	31	—
3% Perp. Pref. ...	72½	68½	72	—
4% Perp. Deb. ...	104½	104	103	—
3% Perp. Deb. ...	84	78½	81	—
IRELAND* BELFAST & C.D.				
Ord.	8⅛	6	7½	—
G. NORTHERN				
Ord.	34	24½	37½	— ½
Pref.	52½	42⅜	57	— 2½
Guar.	80	68	84	—
Deb.	97½	87½	100⅜	—
IRISH TRANSPORT				
Common	—	—	16/9	— 4½
3% Deb.	—	—	101½	—

* Latest available quotation

and Lloyds Limited, but also British industrial enterprise in general.

King's Lynn Docks & Railway Company.—Net revenue for the year ended December 31, 1945, was £5,928, as compared with £5,570 in 1944. Adding balance from previous year (£57) and appropriation from Railways Compensation Account (£750) makes a total of £6,735. Interest on the 4½ per cent. debenture stock requires £6,705, leaving a balance of £30 to be carried forward.

Gauge and Tool Exhibition.—The Coventry Gauge & Tool Co. Ltd. announces that the exhibition of Matrix products at the company's works, Fletchamstead Highway, Coventry, will remain open until Wednesday, May 8. A report of the exhibition, which displays the latest developments in precision measuring instruments and machine tools, was given in our April 12 issue.

Disposal of Government Surplus Machine Tools.—The Ministry of Supply announced recently that the offices of the London Regional Machine Tool Disposal Centre, at present located at 27, Old Queen Street, S.W.1, closed at the termination of business today (April 26). They will reopen at the usual hour on April 29 at Room 0088, Ground Floor, Thames House (North), Millbank, S.W.1 (telephone: Franklin 2211).

Return of F.B.I. Trade Delegation from Denmark.—The delegation from the Federation of British Industries, to which reference was made in our April 12 issue, has returned from Denmark, where, from April 2 to April 5, discussions were held with representatives of Danish trade and industry on questions of current interest concerning Anglo-Danish trade. Invitations to the British delegation were received from Grosserer-Societetets Komite (The Merchants' Guild), Industriraadet (Federation of Danish Industries) and Provinshandelskammeret (The Provincial Chamber of Commerce). Meetings were held in plenary session, and between representatives of particular trades. Among the problems discussed were the possibilities of abolishing the practice of advance payment of goods delivered by Great Britain to Denmark; the relation of British home and export prices; the prospects of increasing British exports to Denmark of raw materials and semi-manufactured goods as against finished products; and the possibility of resuming the export of Danish industrial goods to Great Britain. Individual trade meetings offered an opportunity for the British delegates to give information as to the ability of British industry to deliver immediately, or at a later date, various important goods, including coal, iron and steel, chemicals and machinery. Both parties expressed the wish that normal trade practice and conditions of payment might be restored soon between Great Britain and Denmark. The British delegation agreed to ask the F.B.I. to recommend its members to follow that line, and the delegation will consider where and how it may support to the British authorities the recommendations made by Danish industry and trade. It is stated that it is hoped later to resume the discussions through a committee comprising members of the British industrial delegation and one set up by the three Danish organisations.

Motor Vehicles (Construction and Use).—The Minister of Transport on March 20 made the Motor Vehicles (Construction & Use) (Amendment) (No. 2) Regulations, 1946, for the purpose of facilitating the operation of certain items of contractors' plant used in constructional and engineering work; and the Motor Vehicles (Construction & Use) (Amendment) Regulations, 1946; and the Motor Vehicles (Construction & Use) (Track Laying Vehicles) (Amendment) Regulations, 1946.

Skefko Ball Bearing Co. Ltd.—At a meeting of the Directors of the Skefko Ball Bearing Co. Ltd. held on April 11, it was decided to recommend a final dividend of 6½d. per stock unit of 5s. (10⅝ per cent.), free of income tax, making 9½d. per stock unit of 5s. (15⅝ per cent), free of income tax, for the year ended December 31, 1945. The net profits for 1945 amounted to £130,916, against £180,594 for 1944.

L.M.S.R. Presentation to Shrewsbury School.—On behalf of the London Midland & Scottish Railway Company, of which he is a Director, Mr. Richard F. Summers recently presented to Shrewsbury School the painting of the school by Norman Wilkinson, which forms the original of a well-known L.M.S.R. poster. Mr. Summers is himself an Old Salopian and has two sons who are pupils at the present time. The painting was accepted on behalf of the school by the Headmaster, Mr. J. F. Wolfenden; also present at the ceremony was Mr. F. H. Fisher, L.M.S.R. District Goods & Passenger Manager, Chester.

Air Services to the Channel Isles.—Channel Islands Airways Limited has resumed daily services, Sundays included, between Jersey, Guernsey, Southampton, and London. The company's April timetable shows three services a day from Croydon to Jersey and two in the reverse direction. There is one daily service each way between Croydon and Guernsey. On the Southampton route there are three services a day from Jersey and Guernsey to Southampton, with similar return facilities. Buses run between Southampton Airport and Southampton Central Station in connection with Southern Railway trains to and from Waterloo. The local Jersey—Guernsey service provides four flights daily each way.

Contracts and Tenders

The London office of D. Mitchell & Co. Ltd. has moved back to the City from the wartime address at Kingston-on-Thames. The new address is 44-45, Tower Hill, E.C.3.

Mr. H. E. Edwards, who has been on the staff, first of Steel, Peech & Tozer, and then of the United Steel Companies Limited, for fifty-four years, has decided to retire on grounds of ill health, with effect from June 30 next. Mr. Edwards for many years has been responsible for the sales of all railway materials for the company. Mr. H. A. A. While has been appointed London Manager (Railways Department) to succeed Mr. Edwards (the appointment dating from April 1).

Mr. C. F. Batstone, Midland Branch Manager of the British Aluminium Co. Ltd., has been appointed Principal Assistant Sales Manager, and has taken up his duties in the Sales Department of the Sales Division at the company's head offices, Salisbury House, London Wall, London, E.C.2 (telephone: Clerkenwell 3494). Mr. C. G. Pountney has been appointed Midland Branch Manager, and has taken up his duties at the company's Midland branch office at Lansdowne House, 41, Water Street, Birmingham, 3 (telephone: Birmingham Central 3053).

Below is a list of orders placed recently by the Egyptian State Railways:—

G. E. Mortley Sprague & Co. Ltd.: Armatures.
British Oil Engine (Export) Limited: Spares for power house gabbary.
Buck & Hickman Limited: Engineering tools.
Boulton & Paul Limited: Galvanised wire netting.
R. Melhuish Co. Ltd.: Engraving tools.
P. & W. MacLellan Limited: Steel joints.
Docker Brothers: Paints and varnish.
H. W. Ward & Co. Ltd.: Machine tools.
Whitelegg & Rogers Limited: Locomotive spares.
Robert Hyde & Sons Ltd.: Locomotive spares.
British Rototherm Co. Ltd.: Thermometers.
J. Stone & Co. Ltd.: Copper cable.
Blaenavon Co. Ltd.: Springs and tyres.
Standard Telephones & Cables Limited: Telegraph and telephone material.
Metropolitan-Vickers Electrical Export Co. Ltd.: Gland casings.
Johnson & Phillips Limited: Potential transformers.
The Superheater Co. Ltd.: Superheaters.
R. L. Ross & Co. Ltd.: Safety valves.
Everlasting Valve Co. (Gt. Britain) Ltd.: Blow-down valves.
W. L. Baines & Co. Ltd.: Water gauges.

Railway Stock Market

Cheerful and active stock markets have resulted in a further upswing of values in most sections, with the buying movement widely spread despite the speculative excitement displayed in Orange Free State gold mining shares. British Funds continued their rise (2½ per cent. Consols are now expected in many quarters to reach par), and this again tended to make for a lowering of yields in other sections of markets. Apart from optimistic hopes based on the abolition of E.P.T. at the year-end, industrials were also stimulated by the higher Imperial Chemical profits and the unexpected increase in J. & P. Coats' dividend. In contrast with the general buoyancy, weakness developed in iron and steel shares on the Government's nationalisation announcement, which has created great uncertainty and is bound to hold up big development and expansion plans, because it appears that it will be some time before it is decided which sections of the industry are to be nationalised. Until this is known it will be impossible to arrive at a satisfactory basis for valuing iron and steel shares. Selling of the latter has not been exceptionally heavy, and the lower prices were inclined to attract a little buying. Ramifications and activities of the iron and steel industry are so wide that the nationalisation project is bound to have many repercussions.

No doubt because of the iron and steel developments, which tended to emphasise the comprehensive and widespread nationalisation plans of the Government, home rails lost their recent firmness, junior issues showing fractional declines, although preference and other senior stocks again attracted buyers, the rise in British Funds continuing to influence a trend to higher prices in other front rank investments. Reduction in the net revenue of the railway pool in 1945 disclosed by the White Paper was in line with general expectations in view of the end of wartime traffic. The figures served as a reminder of the necessity of a square deal for the railways in the matter of higher charges to meet increasing costs of labour and materials, a factor which will have to be settled whatever the future of the railways as to nationalisation or working under private enterprise. Last year the statutory annual amount payable to the railways under the fixed rental left £19,078,000 for the Exchequer, as compared with £46,787,000 in 1944. Indications are that in respect of the current year, there may be a loss for the Government instead of a profit, so that for the first time since the control agreement came into force it may work in favour of stockholders at the expense of the Government, because the railways will receive the fixed annual statutory amount of £43,469,000. It is, of course, assumed that the control agreement will remain until the future of the railways has been decided. Even so, the agreement has worked strongly in favour of the Government because, including last year, it has yielded total "profits" to the Exchequer of no less than £195,290,000.

Comparison with a week ago shows that Great Western has eased from 56 to 55¾, but on the other hand, the 5 per cent. preference stock further improved from 111½ to 113, and the guaranteed stock strengthened to 123 and the 4 per cent. debentures to 112½. L.M.S.R. was fractionally lower at 27¾, and the senior preference, after 79½, eased, but at 79 was the same as a week ago; the 1923 preference showed a further small rise at 58. L.M.S.R. guaranteed at 103½ gained a further point, and the 4 per cent. debentures were ¼ better at 107½ and have the same quotation as L.N.E.R. 4 per cent. debentures. L.N.E.R. guaranteed stocks attracted more attention, the firsts further improving from 99 to 101 and the seconds from 92½ to 94. Whereas L.N.E.R. first preference improved from 56½ to 57, the second preference eased from 28½ to 28. On the other hand, Southern preferred moved back slightly from 76 to 75¾, and the deferred from 22⅛ to 21¾, but the 5 per cent. preference was ½ higher at 112½. London Transport "C" gained a point at 61½.

Reflecting the view that prices in this section seem unduly low, Argentine rails have continued to attract buyers, and led by the debentures, there has been an all-round improvement. Buenos Ayres Great Southern was 11, the 5 per cent. preference 25½, and the 4 per cent. debentures 69. Buenos Ayres & Pacific 4 per cent. debentures also rose to 80, Buenos Ayres Western 4 per cents. to 62, Central Argentine 4 per cents. to 61¼, and Argentine Great Western 5 per cent. debentures to 61. In other directions, Antofagasta preference stock was higher at 38¼. Canadian Pacifics receded to 24⅛.

THOS. FIRTH & JOHN BROWN LTD.—A second interim dividend of 4½ per cent., tax free, has been declared on the ordinary capital, which with the interim of 3 per cent. paid last October makes 7½ per cent. for the year. The Directors state that it is unlikely any further dividend will be declared at the annual meeting.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ended	Traffic for week: Total this year	Traffic for week: Inc. or dec. compared with 1944/5	No. of Week	Aggregate traffics to date: Totals 1945/6	Aggregate traffics to date: Totals 1944/5	Aggregate traffics to date: Increase or decrease	Shares or Stock	Prices: Highest 1945	Prices: Lowest 1945	Prices: Apr. 23 1946
				£	£		£	£	£				
South & Central America	Antofagasta	834	14.4.46	34,160	+ 10,720	15	496,880	455,160	+ 41.720	Ord. Stk.	12	8¾	9
	Arg. N.E.	753	13.4.46	ps.320,600	— ps. 51,600	41	ps.12,104,900	ps.12,249,500	— ps.144,600	"	10	5¾	5
	Bolivar	174	Mar., 1946	4,909	— 521	13	14,115	16,068	— 1,953	6 p.c. Deb.	8½	5¼	6½
	Brazil	—	—	—	—	—	—	—	—	Bonds	25	17	25
	B.A. Pacific	2,771	13.4.46	ps.2,432,000	— ps.78,000	41	ps.93,493,000	ps.89,504,000	+ ps.3,989,000	Ord. Stk.	7	5	6
	B.A.G.S.	5,080	13.4.46	ps.3,675,000	+ ps.190,000	41	ps146,707 000	ps.138,138,000	+ ps.8,569,000	Ord. Stk.	13⅜	10½	11½
	B.A. Western	1,924	13.4.46	ps.1,198,000	+ ps.32,000	41	ps. 49,281,000	ps.46.552,000	+ ps.2.719,000	"	12¾	9½	10½
	Cent. Argentine	3,700	13.4.46	ps.3,138.790	+ ps.230,490	41	ps129,559,105	ps.119.034,200	+ ps.10,524,905	"	9¾	7	7¾
	Do.	—	—	—	—	—	—	—	—	Ord.	5	2¾	3½
	Cent. Uruguay	970	13.4.46	48,619	+ 14,735	41	1,601,571	1,405,543	+ 196,028	Ord. Stk.	7¼	4	6½
	Costa Rica	262	Feb., 1946	26,912	+ 1,297	34	222,104	172,502	+ 49,602	Stk.	16½	13	12½
	Dorada	70	Mar., 1946	26,161	+ 2,061	13	85,975	82,705	+ 3,270	1 Mt. Deb.	103	102	101½
	Entre Rios	808	13.4.46	ps.428,800	— ps.40,800	41	ps 17,443,600	ps.16,279,300	+ ps.1,164,300	Ord. Stk.	7¼	4½	5½
	G.W. of Brazil	1,030	13.4.46	26,100	— 100	15	466,900	407,000	+ 59,900	Ord. Stk.	30/-	23/6	20/-
	Inter. Ctl. Amer.	794	Feb., 1946	$899,699	+ $148,466	8	$1,924,216	$1,482,373	+ $441,843	—	—	—	—
	La Guaira	22¾	Mar., 1946	4,421	— 972	12	16,850	15,910	+ 940	5 p.c. Deb.	78	70	61½
	Leopoldina	1,918	13.4.46	54,624	+ 12,153	15	844,817	672,702	+ 172,115	Ord. Stk.	4½	3½	3⅝
	Mexican	483	14.4.46	ps.891,600	+ ps.298,700	15	ps. 12,458,700	ps. 9,193,800	+ ps. 3,264,900	Ord. Stk.	¾	¼	1
	Midland Uruguay	319	Mar., 1946	15,555	— 2,295	37	163,841	156,831	+ 7,010	—	—	—	—
	Nitrate	382	15.4.46	8,568	+ 380	15	65,770	44,413	+ 21,357	Ord. Sh.	75 6	67/6	77/9
	N.W. of Uruguay	113	Mar., 1946	4,444	— 1,384	37	49,140	51,036	— 1,896	—	—	—	—
	Paraguay Cent.	274	19.4.46	£58,608	— £4,530	42	£2,531,803	£2,512,242	+ £19,561	Pr. Li.Stk.	79⅞	77	75½
	Peru Corp.	1,059	Mar., 1946	118,386	— 19,991	38	1,252,842	1,170,479	+ 82,363	Pref.	10¾	7¾	10½
	Salvador	100	Feb., 1946	c 233,000	+ c 27,000	32	c 1,080,000	c 957,000	+ c 123,000	—	—	—	—
	San Paulo	153½	—	—	—	—	—	—	—	Ord. Stk.	60¼	50½	56
	Taltal	156	Mar., 1946	3,530	+ 205	40	28,020	23,370	+ 4,650	Ord. Sh.	17/-	10/6	16/3
	United of Havana	1,301	13.4.46	94,811	+ 27,738	41	2,305,984	2,229,720	+ 76,264	Ord. Stk.	3	1	2
	Uruguay Northern	73	Mar., 1946	1,477	— 361	37	15,691	14,295	+ 1,396	—	—	—	—
Canada	Canadian National	23,569	Feb., 1946	5,771,000	— 475,800	8	11,951,200	12,759,400	— 808.200	—	—	—	—
	Canadian Pacific	17,037	14.4.46	1,013,600	— 179,600	15	16,284,000	17,065,800	— 1,181,800	Ord. Stk.	24	14⅜	24⅛
Various	Barsi Light†	202	Feb., 1946	30,465	+ 10,365	45	278,032	243,082	+ 34,950	Ord. Stk.	131	123	111
	Beira	204	Feb., 1946	63,146	— 9,155	20	337,628	386,578	— 48,950	—	—	—	—
	Egyptian Delta	607	22.2.46	18,343	— 2,696	39	514,206	570,041	— 55,835	Prf. Sh.	10	8¼	6
	Manila	—	—	—	—	—	—	—	—	B. Deb.	71	55½	71½
	Mid. of W. Australia	277	Feb., 1946	15,858	+ 464	32	134,118	155,340	— 21,222	Inc. Deb.	97½	85	75
	Nigeria	1,900	Feb , 1946	350,919	— 35,117	46	3,153,983	3,515,685	— 361,702	—	—	—	—
	Rhodesia	2,445	Feb., 1946	466,118	+ 8,293	20	2,476,064	2,526,805	— 50,021	—	—	—	—
	South African	13,301	6.4.46	1,088,441	+ 128,532	1	1,035,894	902,733	+ 133,161	—	—	—	—
	Victoria	4,774	Nov., 1945	1,252,024	— 55,618	—	—	—	—	—	—	—	—

Receipts are calculated @ 1s. 6d. to the rupee